

## Supraspecific taxonomy of Palaearctic Platycleidini with unarmed prosternum: a morphological approach (Orthoptera: Tettigoniidae, Tettigoniinae)

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### Abstract

Authors analysed 33 supraspecific taxa of Palaearctic Platycleidini with unarmed prosternum, most of them hitherto considered genera or subgenera of *Platycleis* and *Metrioptera*. For each of them they give a short description of the characters revealing the correct classification of males and females. Then, they propose a more consistent classification, when both males and females of a supraspecific taxon are clearly distinct, they should be elevated to distinct genera. On the whole, they propose to classify Palaearctic taxa into 32 genera, for which they propose a key based on the characters used in this paper and illustrated by 140 photographs. Additionally, they describe the following new genera: *Sardoplatycleis* for *Platycleis galvagnii* from Sardinia, *Amedegnatiiana* for *Parnassiana vicheti* from Mediterranean France; and the following new species: *Platycleis buzzettii* from Iran and *Squamiana bressani* from Uzbekistan. For each genus they list all the species known, pointing out also those which, for scarcity of specimens, have been tentatively classified within that genus and that probably should be better assigned to another one. Further, they synonymise *Incertana* with *Decorana*, define the actual taxonomical status of the group *Roeseliana roeselii*, *R. fedtschenkoi*, *R. azami* and *R. brunneri*, reinstate *Tessellana carinata* from Balkan peninsula, establish that *T. nigrosignata* is restricted only to S Italy, while in Balkan peninsula its related *T. orina* occurs.

**Key words:** *Platycleis/Metrioptera* classification, genera/subgenera, morphological characters, taxa description, key to genera, synonymies

### Introduction

A wide scientific literature deals with species concepts (e.g. de Queiroz 1998); conversely, genus category receives less attention. According to Voous (1992), the practicability and direct understanding of the limits of genera and genus-names are the most relevant and appreciated requirements for the genus, and, while species are a reality in nature, genera have no reality, are abstractions, and should be defined pragmatically. This concept is founded on the fact that evolutionary development is gradual, while the distinction of genera is discontinuous. It is a matter of opinion as to how closely related a group of species must be to constitute a genus, which has as its only function that of indicating groups of related species, but it must not be so inclusive as to impinge on the next higher category (Amadon & Short 1992). Genus definitions are based on the presumed phylogenetic origin of groups of species, but in most cases their monophyletic origin has not yet been proved. Within different classes or orders, schools of thought influenced the use of oligotypical or polytypical genera. In some cases, when the systematic of groups of species is not well known, the choice of grouping many species within a single genus seems reasonable (e.g. Turrisi *et al.* 2009). Otherwise, when the systematic is established, the formal use of oligotypical genera seems the forced alternative. In recent decades, the most popular alternative to oligotypical genera has been the use of subgenera, a category comprising a group of species, which are in such a way assigned formally to it. From the biogeographic point of view, the use of subgenera may create some problems, because they can have different primary centres of speciation, both among them and with the genus that groups them together. If we consider the centre of speciation of the whole genus and that one of the single subgenera, the result may be totally different (La Greca 1996).

Zeuner (1941) wrote a comprehensive monograph on the genera *Platycleis* Fieber, 1852 and *Metrioptera* West-mael, 1838, describing 14 genera and, accordingly, ascribing to them a lot of species numbering just less than 80.

He pointed out that some characters could be good for generic separation, but of little phylogenetic value (e.g. the shape of ovipositor), and following the arrangement of Brunner von Wattenwyl (1882), proposed a new division on the base of the female subgenital plate and the shape of the ovipositor. However, on the whole he ascribed to 16 genera the species hitherto included in *Platycleis* and *Metrioptera*.

While the division into different genera was unanimously accepted for some groups of Tettigoniidae, sometimes basing it on characters of minor importance (e.g. *Drymadusini* or *Pholidopterini*), in the case of Platycleidini Brunner von Wattenwyl, 1893 (*sensu* Zeuner 1941), the debate remained open, even after the attempt made by Zeuner (1941) to arrange the systematics of this group. In consequence, for *Platycleis* the use of subgenera has prevailed more than that one of splitting it into different genera, which, however, was also the authoritative opinion stated by Uvarov (1924). Concerning *Metrioptera*, maintaining it as a genus has been justified on grounds of convenience, because it was described before *Platycleis*, and their eventual synonymy should change the entire classification (Ragge 1990).

After Zeuner (1941), the first author to deal with the tribe of Platycleidini was Ramme (1951). He still treated as genera the taxa established by Zeuner (1941), described another genus (*Zeuneriana*) and divided all the genera into two main groups, namely *Platycleis* and *Metrioptera*; accordingly, he listed 12 genera within the first and five within the second one (Table 1). In the same year, Chopard (1951) treating Orthoptera of France, accepted only three genera, *Parnassiana* Zeuner, 1941, just part of French fauna for the newly discovered *Parnassiana vicheti* Delmas et Rambier, 1950, *Platycleis* and *Metrioptera*. Concerning the latter, he considered the genera established by Zeuner (1941) as groups of species and did not find reasons to maintain them, at least for the French fauna. Harz (1969) subdivided European Orthoptera into four genera, *Sepiana* Zeuner, 1941, *Zeuneriana*, *Platycleis* and *Metrioptera*, adopting for *Platycleis* and *Metrioptera* the subgeneric arrangement, adding within the latter also *Broughtonia* and *Vichetia*. Rentz & Colless (1990) examined a large number of genera of Tettigoniidae to establish their affinities on the basis of 82 morphological characters. They examined only seven taxa among those here discussed, namely *Metrioptera*, *Platycleis*, *Sepiana*, *Zeuneriana*, *Semenoviana* Zeuner, 1941, *Squamiana* Zeuner, 1941 and *Sphagniana* Zeuner, 1941. They were still of the opinion that the taxa described by Zeuner (1941), and included in their analysis, should not be accorded generic rank, and accepted only the genera *Metrioptera*<sup>1</sup> and *Platycleis*, including the others as subgenera. Ragge (1990), agreeing with the prevailing view that Zeuner's genera are better treated as subgenera, was inclined to give all genera above cited the status of subgenera. Although he admitted that this division was unsatisfactory, he decided to maintain as European genera only *Platycleis* and *Metrioptera*. La Greca & Messina (1995) were of a different opinion and struck a discordant note, reporting in the Italian check-list all supraspecific taxa at generic level. Heller *et al.* (1998) considered four genera in Europe, *Decorana*, *Metrioptera*, *Platycleis* and *Sepiana*. They listed within the subgenus *Tessellana* Zeuner, 1941 species previously included in *Sporadiana* Zeuner, 1941 and *Incertana* Zeuner, 1941 and within the subgenus *Metrioptera* species hitherto included in *Bicolorana* Zeuner, 1941, *Roeseliana* Zeuner, 1941, *Broughtonia* and *Vichetia*. The key to French species of Défaut (1999) considers five genera, *Platycleis*, *Parnassiana*, *Metrioptera*, *Sepiana*, *Zeuneriana*; *Tessellana* is treated as subgenus of *Platycleis*, while *Metrioptera* includes also the subgenera *Bicolorana* and *Roeseliana*. Çiplak *et al.* (2002) followed the conservative classification of *Platycleis* of Ragge (1990), although one of the authors (K.-G. Heller) had a different opinion about the grouping of some species. However, they included the newly described subgenus *Yalvaciana*. Storozhenko (2004) was of a different opinion and listed within asiatic part of Russia the genera *Platycleis*, *Tessellana*, *Montana* Zeuner, 1941, *Metrioptera*, *Eobiana* Bei-Bienko, 1949, *Bicolorana*, *Chizuella* Furukawa, 1950, *Sphagniana* and *Hypsopedes* Bei-Bienko, 1951. Kočárek *et al.* (2005) listing the species of Czech and Slovak Republics, treated only two genera, *Platycleis* and *Metrioptera*. Finally, Eades & Otte (2008) and Eades *et al.* (2010) listed seven genera: *Platycleis*, *Montana*, *Tessellana*, *Metrioptera*, *Sphagniana*, *Bicolorana* and *Zeuneriana*.

While taxa included within Platycleidini *sensu* Zeuner (1941) have been alternately considered genera or subgenera, the others, included within Platycleidini *sensu* Rentz & Colless (1990) were unanimously considered valid genera. Table 1 summarizes the opinion of orthopterists after Zeuner (1941) to the present, only relating the group *Platycleis/Metrioptera* s.l.

As it may be easily observed, orthopterists are not in agreement with the systematic arrangement of the group *Platycleis/Metrioptera* *sensu lato*. Further, while Zeuner (1941) wrote 50 pages to arrange the classification of this

1. Rentz & Colless (1990) report *Zeuneriana* both as subgenus of *Metrioptera* and as a separated genus.

group, no succeeding author devoted some lines to explain the choice between genera and subgenera. Consequently, a further attempt to understand the actual affinities among these groups of insects is needed. As Rentz & Colless (1990) offered their classification of Tettigoniidae for criticism by the community of orthopterists, we believe that there is the dialectical room for a wider discussion on a small set of the large number of taxa treated by them.

TABLE 1. Systematic arrangement followed by main Authors who treated the group *Platycleis/Metrioptera* s.l.

Authors	Genus-groups	
Ramme 1951	Genera in <i>Platycleis</i> -group	
	<i>Platycleis, Squamiana, Alticolana, Sepiana, Montana, Semenoviana, Sporadiana, Incertana, Tessellana, Parnassiana, Decorana, Eumetrioptera</i>	
	Genera in <i>Metrioptera</i> -group	
	<i>Metrioptera, Sphagniana, Zeuneriana, Bicolorana, Roeseliana</i>	
	Genera	Subgenera
Chopard 1951	<i>Platycleis</i>	<i>Platycleis, Tessellana</i>
	<i>Metrioptera</i>	<i>Metrioptera, Sepiana, Bicolorana, Roeseliana</i>
	<i>Parnassiana</i>	
Harz 1969	<i>Sepiana</i>	
	<i>Zeuneriana</i>	
	<i>Platycleis</i>	<i>Platycleis, Parnassiana, Tessellana, Montana, Modestana, Incertana</i>
	<i>Metrioptera</i>	<i>Metrioptera, Decorana, Bicolorana, Roeseliana, Broughtonia, Vichezia</i>
Rentz & Colless 1990	<i>Metrioptera</i>	<i>Metrioptera, Sphagniana, Zeuneriana, Eobiana, Bicolorana, Vichezia, Broughtonia, Roeseliana</i>
	<i>Platycleis</i>	<i>Platycleis, Montana, Semenoviana, Parnassiana, Squamiana, Alticolana, Modestana, Sepiana, Tessellana, Incertana, Decorana, Sporadiana, Eumetrioptera</i>
Ragge 1990	<i>Platycleis</i>	<i>Platycleis, Montana, Semenoviana, Parnassiana, Squamiana, Alticolana, Modestana, Sepiana, Tessellana, Incertana, Decorana, Sporadiana, Eumetrioptera</i>
	<i>Metrioptera</i>	Not treated by the Author, only cited
La Greca & Messina 1995	<i>Platycleis, Tessellana, Montana, Modestana, Metrioptera, Roeseliana, Bicolorana, Zeuneriana, Sepiana</i>	
Heller <i>et al.</i> 1998	<i>Decorana</i>	
	<i>Metrioptera</i>	<i>Metrioptera (Bicolorana, Roeseliana, Broughtonia and Vichezia are synonymized with Metrioptera), Zeuneriana</i>
	<i>Platycleis</i>	<i>Platycleis, Modestana, Montana, Parnassiana, Tessellana (Sporadiana and Incertana are synonymized with Tessellana)</i>
	<i>Sepiana</i>	
Défaut 1999	<i>Platycleis</i>	<i>Tessellana</i>
	<i>Parnassiana</i>	
	<i>Metrioptera</i>	<i>Metrioptera, Bicolorana, Roeseliana</i>
	<i>Sepiana</i>	
	<i>Zeuneriana</i>	

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**TABLE 1** (continued)

Authors	Genera	Subgenera
Çiplak <i>et al.</i> 2002	<i>Platycleis</i>	<i>Platycleis, Incertana, Montana, Sepiana, Sporadiana, Squamiana, Tessellana, Yalvaciana</i>
Storozhenko 2004	<i>Platycleis, Tessellana, Montana, Metrioptera, Eobiana, Bicolorana, Chizuella, Sphagniana, Hypsopedes</i>	
Eades & Otte 2008, Eades <i>et al.</i> 2010	<i>Platycleis</i>	<i>Platycleis, Alticolana, Decorana, Eumetrioptera, Modestana, Parnassiana, Semenoviana, Sepiana, Sporadiana, Squamiana, Yalvaciana</i>
	<i>Montana</i>	
	<i>Tessellana</i>	<i>Incertana</i> is considered synonym of <i>Tessellana</i>
	<i>Metrioptera</i>	<i>Metrioptera, Broughtonia, Vichetia</i>
	<i>Sphagniana</i>	
	<i>Bicolorana</i>	<i>Bicolorana, Roeseliana</i>
	<i>Zeuneriana</i>	

## Material examined

Within the Tettigoniidae, the tribe of Platycleidini may have unarmed prosternum or bearing two spines; additionally, taxa belonging to this tribe may have two or four apical spurs on ventral side of hind femora. In this paper we have treated those with unarmed prosternum and four apical spurs; thus, we excluded the following with the prosternum bearing two spines: *Anonconotus* Camerano, 1878 (which, however, has the pronotum very wrinkled dorsally), *Pterolepis* Rambur, 1838, *Antaxius* Brunner von Wattenwyl, 1882, *Anterastes* Brunner von Wattenwyl, 1882, *Rhacocleis* Fieber, 1853, *Yersinella* Ramme, 1933 (the last four have two apical spurs on the ventral side of the hind femora<sup>2</sup>). Therefore, we excluded all the American and Australasian genera (11 on the whole), and the Ethiopian genus *Decticoides* Ragge, 1977. Also, we did not include *Plicigastra* Uvarov, 1940 (which has very wrinkled teguments and straight ovipositor) and the genera characterized by very large pronotum (from above), namely *Pachytrachis* Uvarov, 1940 (characterized by ♂ cerci very long and without internal tooth, and straight ovipositor), *Schizonotinus* Ramme, 1848 (which shows the male X<sup>th</sup> tergite straight and provided with very large cerci, and together *Pachytrachis*, has very rounded pronotum, the apical part of ♂ tegmina strongly reduced and ♀ tegmina with only a network of veinlets), and *Bolua* Ünal, 2000, considered by its author related to *Metrioptera* (Ünal 2000), but according to Çiplak & Heller (2001) more related to *Pachytrachis* and Pholidopterini. Finally, we excluded from our analysis *Psorodonotus* Brunner von Wattenwyl, 1861 (which has a very long and wrinkled pronotum, 2–3 times as long as fore femora), *Bucephaloptera* Ebner, 1923 and *Festella* Giglio Tos, 1894, all bearing four spines on outer border of fore femora, the last two having also very long flaps on hind tarsi (Uvarov 1927, Harz 1969, Çiplak 2000).

We examined thousands of specimens preserved in the following institutions: Muséum National d'Histoire Naturelle, Paris (MNHN), Naturhistorisches Museum, Wien (NMW), Museum für Naturkunde der Humboldt-Universität, Berlin (ZMHB), Museo Civico di Storia Naturale, Milan (MSNM), Museo Civico di Storia Naturale 'G. Doria', Genoa (MSNG), Museo di Zoologia, University of Rome (MZR), coll. B. Massa, University of Palermo (BMCP), coll. P. Fontana, Isola Vicentina (PFCV). Series of images of specimens with different focal planes were taken using a Nikon Coolpix 4500 digital camera, mounted on a Stereomicroscope Optech EMX-210-2, and were integrated using the freeware CombineZM (Hadley 2008). Measurements on mounted specimens (length of pronotum, hind femora, tegmina and ovipositor) were taken using a digital calliper (precision 0.01 mm). When series of specimens were used to confirm their validity, they have been listed in parentheses in the list of species.

2. Even if *Pterolepis* more commonly has four, there are specimens with two apical spurs (cf. Willemse & Willemse 2005).

## Characters used

One of the best characters, the wing structure (also used to identify fossil remains, Zeuner 1939), cannot be used for all the taxa, because some groups have undergone a more or less substantial wing reduction. Additionally the wing length is subjected to selective pressure and consequently it may be variable within every group. Although other characters may be also subjected to selection, their function does not involve a drastic change; e.g. the wing reduction may be ecologically well correlated to the habitat, while the length of the hind femora is generally correlated both to species habits and to its size. Generally a good indicator of the hind femora may be its ratio with the length of the pronotum; species with longer hind femora possibly have a higher jump power, independently from the habitat where they occur, and this character may be used to separate groups of species. We measured males and females of many specimens to obtain the ratio 'hind femora length/pronotum length', which may be a good measure of the slenderness of legs compared with the body structure, that is an indicator of their jump ability. Additionally, although previous authors give little importance to it, we reconsidered the shape of the pronotum as a good phylogenetic character. Its definitive shape is acquired only by adult individuals; e.g. the characteristic humeral excision on the lateral lobes of the pronotum of species belonging to *Platycleis sensu stricto*, is absent in the subadult nymphs, when their pronotum lobes and rounded borders are more similar to those of a *Pholidoptera* Wesmael, 1838 or of other groups of Platycleidini. The absence of the excision may be considered a juvenile character, which may remain unmodified or evolve into an excised pronotum in the adult. This excision is similar to that present in the genus *Decticus* Serville, 1831, well separated from Platycleidini, by the presence of four instead of three spines on the outer upper side of the fore tibiae. In addition, groups with excised pronotum lobes, such as *Platycleis* s. str., *Tessellana* and *Montana*, always retain a thick keel on the metazona of the pronotum, possibly another ancient character shared with *Decticus*. Further, groups of species may be easily separated by their rounded, flat or depressed pronotal disc. Thus, the pronotum provides useful information to appreciate relationships among groups. The tenth tergum of the males generally bears a pair of processes, which may be short, long, wide, or narrow, and may contribute to better define groups of species; in some cases it may be very variable, in others it seems well characterized.

The ovipositor is generally compressed laterally, except at the very base; only in *Semenoviana*, *Montana* and *Parnassiana* it is broad, *Decticus*-type, i.e. thick in the basal third, wider than high near the base. To some extent, *Eumetrioptera* also has an atypical ovipositor. The shape of the ovipositor, however, seems a good character to separate homogeneous groups of species.

The subgenital plate of females is also characteristic for some groups, with two parallel raised keels, flat, straight or incised.

The pattern of colours on the lobes of the pronotum is an ambiguous character; black lobes surrounded by a cream-whitish strip is present in different species belonging to almost all the groups here considered. However, we have recorded the colour pattern of the pronotum and the colour of the ovipositor, which instead is generally typical of different taxa (e.g.: whitish in *Montana*, blackish with a whitish base in *Platycleis*, etc.).

Even if we know that songs are very important discriminatory means, as it has been demonstrated by some orthopterists (e.g. Heller 1988, Ragge 1990, Ragge & Reynolds 1998), we decided do not use them, because this kind of elaboration will go beyond our purposes.

Altogether, we considered as valid genera those where it was possible to recognize identificative characters both in males and in females.

## Results and discussion

We report the results of comparisons, for each taxon, also based on Zeuner (1941), Ramme (1951), Harz (1969), Ragge (1990), Çiplak *et al.* (2002) and Ünal (2006). Our conclusions do not agree with previous arrangements, as below reported. We believe that the division of *Platycleis/Metrioptera* into different genera is the right way to classify this group of insects. Table 3 summarizes characteristics of taxa here considered.

## Combination of characters shared by different taxa

### Median keel

The pronotal disc may be depressed, flat or rounded; a median keel is generally present in the metazona, mainly when the pronotum is depressed or flat, but it is more or less obliterated when the pronotum has rounded borders and disc. When the keel is present it may be more or less raised. It proved to be well raised in *Platycleis*, *Sardoplatycleis*, *Tessellana*, *Montana*, *Pravdiniana*, *Metrioptera*, *Bicolorana*, *Roeseliana*, *Broughtonia*, *Vichetia*, *Zeuneriana*, *Parnassiana*, *Amedegnatiana*, *Squamiana*, *Semenoviana*, *Eobiana*, *Chizuella* and *Yalvaciana*, all characterized by depressed or flat pronotum; conversely, it was obliterated or absent in *Alticolana*, *Eumetrioptera*, *Modestana*, *Sphagniana*, *Sporadiana*, *Sepiana*, *Incertana*, *Decorana* and others, characterized by rounded pronotum borders and disc.

### Pronotum shape

The lateral hind margins of the pronotal lobes may be clearly excised, just excised or not excised at all. Pronotal lateral shape may be nearly triangular, as in *Sepiana*, or obliquely converging, such as in *Decorana*, *Incertana* and others. In *Platycleis* and *Sardoplatycleis* the excision of the hind margins of the pronotum lies at ca. 3/4 of its length, in *Tessellana* at 4/5, while in *Montana*, *Metrioptera*, *Bicolorana*, *Roeseliana*, *Broughtonia*, *Vichetia*, *Zeuneriana*, *Parnassiana* and *Semenoviana* the pronotum is less clearly excised, just sinuous and extended in the last portion. In other taxa any evident excision is present and the hind lateral margins of the pronotum are obliquely shaped, not much extended in the last portion.

### Length of hind femora

This ratio 'hind femora length/pronotum length' showed to be much variable in some groups, less in others. Some taxa show a high variability of it, as *Platycleis*, others are characterized by very long legs, as *Sepiana*, *Incertana*, *Tessellana*, *Montana*, *Modestana* and *Bicolorana*, some have very short femora, as *Eumetrioptera*, *Parnassiana*, *Amedegnatiana*, *Sporadiana* and to a lesser extent *Zeuneriana*; remaining taxa have femora of intermediate length. Interestingly, groups bearing long legs are present within both those with and without humeral excision on the pronotum, and within macropterous or micropterous species, which should indicate that this character differentiated independently in the groups.

## 1) *Platycleis* Fieber, 1852 (Figs. 1, 48, 78, 106)

**Characters.** Head large, ratio maximum width/length of head (from vertex to clipeus): 1.3–1.4. Pronotum depressed, with clear humeral excision at 3/4 of its length, median keel raised on metazona; ♀ subgenital plate with two lobes separated by a furrow; ovipositor regularly curved upwards, compressed, ca. 1/2 hind femur; ♀ VI–VII<sup>th</sup> sternites modified or not; hind femora of varied length, hind femora/pronotum length ♂: 3.0–4.1, ♀: 3.1–4.4; ♂ X<sup>th</sup> tergite with two short pointed processes. Titillators are generally uniform, the most aberrant are those of *P. escalerae* and *P. waltheri* (cf. Harz 1969). Colour of lateral lobes of the pronotum is greyish bordered with a white stripe.

**Remarks.** The shape of the pronotum is very characteristic, as well as the ovipositor and subgenital plate. Tegmina are very abbreviated in some species, which may be considered as micropterous. *P. grisea* is generally considered a subspecies of *P. albopunctata*, but the evident differences in the shape of the ♀ subgenital plate and titillators are sufficient to separate them as valid species, which in their western distribution overlap; for this reason we consider them as distinct species. Conversely, we consider *P. umbilicata* Costa, 1885 from Sardinia as synonym of *P. intermedia*. Some species considered as belonging to *Platycleis*, living in Caucasus and Tadzhikistan, could be better assigned to another genus (cf. below and Eades *et al.* 2010).

**Distribution.** It covers E Asia to W Europe and N Africa.

**Number of species known** (after Eades *et al.* 2010, modified): 35, including a new species from Iran below described: 1) *affinis* Fieber, 1853; 2) *albopunctata* (Goeze, 1778); 3) *alexandra* (Uvarov, 1927); 4) *burri* Uvarov, 1921; 5) *buzzettii* Massa et Fontana, present paper (it probably does not belong to *Platycleis*); 6) *concii* Galvagni, 1959; 7) *curvicauda* Podgornaya, 1988; 8) *deminuta* Fruhstorfer, 1921; 9) *elytris* Uvarov, 1910; 10) *ehrmanni* Harz, 1991 nomen nudum; 11) *escalerae* Bolivar, 1899; 12) *falk* (Fabricius, 1775); 13) *fatima* Uvarov, 1912; 14) *grisea* (Fabricius, 1781) (type species); 15) *hannae* Harz, 1991 nomen nudum; 16) *iberica* Zeuner, 1941; 17) *iljin-*

*skii* Uvarov, 1917 (it probably does not belong to *Platycleis*); 18) *intermedia* (Serville, 1838); 19) *irinae* Sergeev et Pokivajlov, 1992 (it probably does not belong to *Platycleis*); 20) *kabulica* Bei-Bienko, 1967; 21) *kashmira* (Uvarov, 1930); 22) *latitabunda* Stolyarov, 1968; 23) *longicauda* (Tarbinsky, 1930); 24) *longis* Uvarov, 1910; 25) *meridiana* Stolyarov, 1969 (it probably does not belong to *Platycleis*); 26) *pamirica* (Zeuner, 1930); 27) *pathana* Zeuner, 1941; 28) *ragusai* Ramme, 1927; 29) *romana* Ramme, 1927; 30) *sabulosa* Azam, 1901; 31) *sogdiana* Mishchenko, 1954 (it probably does not belong to *Platycleis*); 32) *speciosa*† Heer, 1865; 33) *trivittata* Bei-Bienko, 1951; 34) *turanica* Zeuner, 1930; 35) *waltheri* Harz, 1966.

### *Platycleis buzzettii* Massa et Fontana n. sp. (Figs. 11–16)

**Examined material and type depository:** ♀ holotype, N Iran, Mazandaran, Rudbarak (= Kūh-e Rūdbārak), 950–1200 m, 12.VI.2001, leg. G. Sama (PFCV).

A female of a very distinctive species collected in Iran is an undescribed species; because its characteristics are very unique, we decided to describe it.

**Diagnosis.** Large brachypterous species, characterized by long pronotum, stout hind femora and very peculiar subgenital plate; the ratio hind femora/pronotum length (2.35) lies below the smallest known (3.0) for the genus.

**Female description.** Ground colour, light brown with black markings over eyes and in the middle of the fastigium; two clear bands are present above the eyes and two small dark elongated vertical spots are placed laterally in the middle of face; lateral lobes of pronotum mostly light brown with wide lateral margins marked inside by two vertical curved dark bands. Upper surface of hind femora with small dark markings. Abdomen clear brown, with two dorso-lateral vanishing blackish longitudinal bands. Tegmina with typical black spots and reduced veins; radial and median veins thick, nearly parallel, without dark markings between them; wings just shorter than tegmina. Head stout, rising in lateral view above the pronotal disk; eyes scarcely prominent. Fastigium wider than the maximum eye diameter. Pronotum with dorsal surface plane, evidently keeled on metazona and with widely rounded posterior margin; humeral excision on hind margin of lateral lobes not much evident, placed almost at 3/4 of total pronotum length. Tegmina reduced, apically round, shorter than the abdomen, ending a little before the end of 1/3 of hind femur; wings about 2/3 of tegmina length. X<sup>th</sup> tergite widely concave in the middle, forming a scarcely deep concavity defined by two small subtriangular lateral processes. Cerci long, tapering, clearly acuminate in apical third. VII<sup>th</sup> sternite modified, swollen on basal two thirds with two small sublateral tubercles placed before the middle and a small transversal keel just before hind margin; fore margin rounded and hind margin straight. Subgenital plate subrectangular, its hind margin widely incised, longitudinally divided for all its length and forming on the hind margin two wide rounded lobes. Ovipositor robust, short and upcurved, light coloured on basal third and black in the distal 2/3; lower margin of ventral valvae weakly toothed.

**Male:** unknown.

**Measurements** (in mm). Total length from the head to the apex of abdomen: 25.3; from the head to the apex of hind femur: 42.24; pronotum length: 10.88; pronotum height: 6.4; length of tegmina: 13.6; length of hind femora: 25.6; height of hind femora: 6.56; length of ovipositor: 11.52; hind femora/pronotum length: 2.35.

**Derivatio nominis:** we are glad to name the new species after our dear Italian friend and orthopterologist Filippo Maria Buzzetti, who kindly provided us with the unique specimen of this interesting new species.

**Remarks.** In absence of the male, we have tentatively placed this species within the genus *Platycleis*, but the pronotum shape with scarcely evident humeral excision, and the subgenital plate shape are very unusual, and possibly, when the male will be known a new supraspecific taxon should be established for it. Additionally, Garai (2008) recorded one unidentified female of *Platycleis* from Minac (Iran), ca. 80 kms from Rudbarak; she sent us some photographs of that specimen, whose aspect looks very like our specimen; nevertheless, it shows a similar pattern of pronotum, hardly excised, but not as elongated as our specimen, a similar VII<sup>th</sup> sternite, but a different subgenital plate (Figs. 12, 14, 16). Measurements are as follows (mm): total length from the head to the apex of abdomen: 22; pronotum length: 6.5; length of tegmina: 11; length of hind femora: 21; length of ovipositor: 11; hind femora/pronotum length: 3.2 (G.A. Garai, pers. comm.). Further material and the male examination are needed, but even if we may consider this specimen much related to *P. buzzettii*, it seems not belonging to the same species.

## 2) *Sardoplatycleis* new genus (Figs. 4, 49, 79)

Fontana *et al.* (2011) recently described a new species of *Platycleis* from Sardinia; general habitus is close to *Platycleis*, albeit it has a very small size. When looking at other characters the species does not seem to fit within one of the groups recognised within *Platycleis sensu lato*, but the authors decided to place it tentatively in *Platycleis*. However, for the reasons below reported, we decided to establish for it a new genus.

**Description.** Very small, macropterous, tegmina as long as wings, with rounded apex. Pronotal disk almost plane, markedly restricted before typical sulcus, which is placed in the middle, hind margin well rounded. Lateral carinae not well marked; median keel marked only in metazona. Lateral lobes of pronotum obliquely inserted, not as deep as pronotal length. Humeral excision on hind margin of lateral lobes placed almost at  $\frac{3}{4}$  of total pronotum length, less evident than in *Platycleis*. Hind femora 4.5 times long as maximum high. Hind femora/pronotum length ♂: 3.4–3.7, ♀: 3.6–3.9; male X<sup>th</sup> tergite widely concave in the middle forming a “V” incision on the hind margin and two pointed lateral processes directed backward. Cerci digitiform, more or less cylindrical, tapering to the rounded apex; inner tooth situated slightly behind middle. Female subgenital plate subtrapezoidal with hind margin “V” incised, completely lacking the characteristic median groove present in *Platycleis*. Female ovipositor is quite robust, light coloured in the basal half (differently from *Platycleis*, where only the ovipositor base is whitish), regularly upcurved and gently toothed on lower margin. Colour of lateral lobes of the pronotum is black bordered with a white stripe.

**Derivatio nominis.** *Platycleis* from Sardinia (Italy).

**Remarks.** It is well characterized by its small size, the shape of the pronotal excision, ovipositor colour and female subgenital plate.

**Number of species known:** 1) *galvagnii* (Fontana, Buzzetti, Kleukers et Odé, 2011) (type species).

## 3) *Tessellana* Zeuner, 1941 (Figs. 2, 43–47, 64, 80, 107)

**Characters.** Head as wide as long, ratio maximum width/length of head (from vertex to clipeus): 1.0–1.1. Pronotum slightly depressed above, keeled mainly in the metazona (*T. carinata* is keeled on the entire pronotum), humeral excision present at 4/5 of its length, less evident than in *Platycleis*; ♀ subgenital plate with a median furrow; ovipositor very short, rapidly tapering and sharply bent upwards near the base; ♀ VII<sup>th</sup> sternite with a sharp longitudinal ridge; hind femora/pronotum length ♂: 3.4–4.2, ♀: 3.5–4.3; ♂ X<sup>th</sup> tergite with two short processes, apically rounded or pointed. Titillators are very small and with thorny apex, basal arms with spines. Differing from other related taxa (in which eggs are brownish), eggs of *Tessellana* are black. Colour of lateral lobes of the pronotum is blackish-grey bordered with a white stripe.

**Remarks.** Tegmina are much variable, some species are macropterous with some micropterous specimens, while others are only micropterous. Zeuner (1941) also tentatively included within this taxon also one species, later transferred to *Decorana* (*D. seniae*) (see below), but maintained by Ragge (1990). The shape of the pronotum of *Tessellana* is similar to that of *Montana stricta*, but other characters indicate the separation of *Tessellana* from *Montana*. *Tessellana* is clearly different from *Platycleis* and separated from it, both on the base of pronotum shape, male processes and ovipositor shape. Additionally, *Incertaina* and *Sporadiana*, considered by some authors (cf. Table 1) synonyms of *Tessellana*, are also separated from the latter (see below).

**Distribution.** It has a palearctic distribution from Turkey and the Caucasus to central Europe and the Mediterranean (N Africa included); *T. tessellata* has been introduced in N America (California: Strohecker 1955).

**Number of species known** (after Eades *et al.* 2010, modified): 6 (in parentheses specimens examined): 1) *carinata* (Berland et Chopard, 1922) (3 males and 1 female from Macedonia, 2 males and 2 females from Greece); 2) *lagrecai* Messina, 1979 (38 males and 17 females from the type locality: Ficuzza, Sicily); 3) *nigrosignata* (Costa, 1863) (29 males and 21 females from South Italy); 4) *orina* (Burr, 1899) (58 males and 62 females from Greece and Albania); 5) *tessellata* (Charpentier, 1825) (type species) (20 males and 20 females from Italian peninsula, 7 males and 10 females from Sardinia, 4 males and 4 females from Corsica, 4 males and 4 females from Lampedusa Is. (Sicilian Channel), 30 males and 25 females from Sicily (with different wing length), 2 males from Tunisia, 1 male and 1 female from France, 2 males and 1 female from Spain, 2 males from Slovenia, 5 males and 2 females from Georgia and Armenia); 6) *veytseli* (Koçak, 1984) (20 males and 18 females from Serbia, Hungary, Albania, Georgia and Armenia).

**Taxonomical note.** Authors (e.g. La Greca 1959, Harz 1969, Willemse 1984, 1985, Çiplak *et al.* 2002) generally consider *Tessellana nigrosignata* present in the Balkan peninsula and Turkey. It has been described by Costa (1863) from Calabria (Italy), and differs from Balkan specimens, which should be identified as *T. orina*. There are actually in the Balkan peninsula two species of *Tessellana*, namely *T. orina* and *T. carinata*, generally considered a synonym of *T. nigrosignata*. We report here historical records that caused this uncertain status.

After the description of *Tessellana nigrosignata* (type locality: South Italy, province of Reggio Calabria) two other related species were described, namely *T. orina* (type locality: Bosnia-Herzegovina) and *T. carinata* (type locality: Macedonia, Vakoufkoi, NE of Florina). When Berland & Chopard (1922) described *T. carinata* on a single specimen, pointed out that it is smaller than *T. orina* and shows all the pronotum keeled. Uvarov (1924) studied the types of *T. orina* and established the synonymy *carinata* Berland et Chopard, 1922 = *orina* Burr, 1899 = *nigrosignata* Costa, 1863; however, he did not examine Italian material of *nigrosignata* and the type of *carinata*. The types of *nigrosignata* are lost, but the species has been collected in different localities of South Italy (Campania, Basilicata, Calabria and Apulia: La Greca 1959, pers. obs.). Comparison of the Italian specimens with those collected in the Balkan peninsula and considered *T. nigrosignata* was needed to establish if this species actually covers other regions other than South Italy. We examined many European and Anatolian specimens (preserved in MSNM, PFCV and BMCP, cf. above examined material) that allowed us to state that even if Italian specimens are very similar to *T. orina* (which lives in the Balkan peninsula and Turkey), they differ for some characters; additionally *T. carinata* proves to be a valid species and its distribution has to be determined better by checking specimens preserved in museums and collections, some of which are possibly erroneously labelled as *T. nigrosignata/orina*.

Biometrics distinguish between (mainly in the males, Table 2) the above cited three species, in particular if the length of pronotum is plotted with the ratio length of hind femora/length of tegmina (Fig. 47). *T. carinata* is a very small species well characterized by its evident keel on the pronotum (Fig. 44), while in *T. orina* and *T. nigrosignata* the keel is evident only in the metazona (Fig. 43). In addition, the radius sector of tegmina in *T. nigrosignata* and *T. orina* has a different shape, being a median veinlet in *T. nigrosignata* closer to cubitus than in *T. orina* (Figs. 45–46).

We also included in the Fig. 47 other *Tessellana* so far described and considered valid species. *T. veyseli*, well characterized by the shape of tegmina (pointed) and the VII<sup>th</sup> female sternite (whose tip exceeds the fore margin of the subgenital plate), is biometrically more related to *T. tessellata*, but has longer femora than it; interestingly, also songs of them are much similar (Heller 1988, Ragge 1990), as well as those of other *Tessellana* (Ragge & Reynolds 1998). Concerning *T. tessellata*, it is seen to be very variable, in particular in Sicily, where there are populations characterized by different length of wings; one of them has been named *T. lagrecai*. Nevertheless, many differences in biometrics of these taxa proved to be significant (Kruskal-Wallis test and multiple comparisons by Wilcoxon test; cf. Tables 2a, 2b).

**TABLE 2a.** Biometrics of species of the genus *Tessellana*.

♂	Length of pronotum	Length of tegmina	Length of hind femora
<i>T. tessellata</i>	3.84 ± 0.31	13.45 ± 2.10	13.81 ± 3.55
<i>T. lagrecai</i>	4.00 ± 0.17	9.02 ± 0.68	14.19 ± 0.73
<i>T. veyseli</i>	3.68 ± 0.17	8.05 ± 0.71	15.63 ± 0.79
<i>T. carinata</i>	3.77 ± 0.09	4.9 ± 0.17	14.55 ± 0.29
<i>T. orina</i>	4.23 ± 0.27	4.86 ± 0.57	16.20 ± 0.95
<i>T. nigrosignata</i>	5.04 ± 0.39	5.45 ± 0.39	18.30 ± 0.48
Kruskal-Wallis test	$F_{5,87}=39.95$ ; $P<0.0001$	$F_{5,87}=76.94$ ; $P<0.0001$	$F_{5,85}=37.99$ ; $P<0.0001$
♀	Length of pronotum	Length of tegmina	Length of hind femora
<i>T. tessellata</i>	3.92 ± 0.37	13.52 ± 2.05	15.43 ± 1.47
<i>T. lagrecai</i>	4.10 ± 0.21	9.07 ± 0.52	15.17 ± 0.63
<i>T. veyseli</i>	3.95 ± 0.14	7.93 ± 0.46	16.60 ± 0.54
<i>T. carinata</i>	3.95 ± 0.06	4.75 ± 0.61	15.67 ± 1.02
<i>T. orina</i>	4.76 ± 0.28	5.23 ± 0.40	16.36 ± 0.75
<i>T. nigrosignata</i>	4.84 ± 0.35	5.18 ± 0.37	18.98 ± 0.61
Kruskal-Wallis test	$F_{5,86}=38.65$ ; $P<0.0001$	$F_{5,86}=70.98$ ; $P<0.0001$	$F_{5,86}=27.74$ ; $P<0.0001$

**TABLE 2b.** Multiple comparisons of biometrics of *Tessellana* species, by Wilcoxon test (in bold significant values).

Pairs of species	Pronotum length		Length of tegmina		Length of hind femora	
	males	females	males	females	males	females
<i>T. carinata</i> versus <i>T. lagrecai</i>	<b>0.0184</b>	0.0754	<b>0.0030</b>	<b>0.0031</b>	0.3603	0.3506
<i>T. nigrosignata</i> versus <i>T. carinata</i>	<b>0.0148</b>	<b>0.0307</b>	<b>0.0093</b>	0.3484	<b>0.0137</b>	<b>0.0324</b>
<i>T. orina</i> versus <i>T. carinata</i>	<b>0.0172</b>	<b>0.0139</b>	<b>0.0071</b>	0.2634	<b>0.0106</b>	0.3503
<i>T. tessellata</i> versus <i>T. carinata</i>	0.6515	0.9112	<b>0.0023</b>	<b>0.0023</b>	0.7520	0.7803
<i>T. veyseli</i> versus <i>T. carinata</i>	0.4697	0.9323	0.4384	<b>0.0174</b>	0.0803	0.2468
<i>T. orina</i> versus <i>T. lagrecai</i>	<b>0.0183</b>	<0.0001	<0.0001	<0.0001	<b>0.0003</b>	<b>0.0033</b>
<i>T. nigrosignata</i> versus <i>T. lagrecai</i>	<b>0.0003</b>	<b>0.0042</b>	<b>0.0002</b>	<b>0.0018</b>	<b>0.0003</b>	<b>0.0026</b>
<i>T. tessellata</i> versus <i>T. lagrecai</i>	<b>0.0281</b>	<b>0.0156</b>	<0.0001	<0.0001	0.5521	0.7803
<i>T. veyseli</i> versus <i>T. lagrecai</i>	<b>0.0048</b>	0.0710	<b>0.0005</b>	<b>0.0023</b>	<b>0.0050</b>	<b>0.0026</b>
<i>T. orina</i> versus <i>T. nigrosignata</i>	<b>0.0034</b>	0.7680	<b>0.0245</b>	0.9510	<b>0.0031</b>	<b>0.0026</b>
<i>T. tessellata</i> versus <i>T. nigrosignata</i>	<b>0.0002</b>	<b>0.0039</b>	<0.0001	<b>0.0009</b>	<b>0.0003</b>	<b>0.0026</b>
<i>T. veyseli</i> versus <i>T. nigrosignata</i>	<b>0.0049</b>	<b>0.0156</b>	<b>0.0032</b>	<b>0.0109</b>	<b>0.0050</b>	<b>0.0108</b>
<i>T. tessellata</i> versus <i>T. orina</i>	<b>0.0038</b>	<0.0001	<0.0001	<0.0001	<b>0.0043</b>	<b>0.0322</b>
<i>T. veyseli</i> versus <i>T. orina</i>	<b>0.0049</b>	<b>0.0042</b>	<b>0.0023</b>	<b>0.0023</b>	0.3154	0.8279
<i>T. veyseli</i> versus <i>T. tessellata</i>	0.2650	0.7680	<b>0.0003</b>	<b>0.0004</b>	0.0803	<b>0.0322</b>

#### 4) *Semenoviana* Zeuner, 1941

**Characters.** Pronotum depressed, humeral excision and keel present; ♀ subgenital plate straight, with a furrow or a keel; ovipositor recurved near base, then fairly straight and tapering rapidly, not laterally compressed; VI–VII<sup>th</sup> sternites sculptured; ♂ X<sup>th</sup> tergite with two short processes.

**Remarks.** It is a taxon related to *Montana*.

**Distribution.** E and C Asia.

**Number of species known** (after Eades *et al.* 2010): 6: 1) *afghana* (Ramme, 1939); 2) *plotnikovi* (Uvarov, 1914); 3) *similis* (Tarbinsky, 1930); 4) *tadzhika* (Bei-Bienko, 1933); 5) *tamerlana* (Saussure, 1874) (type species); 6) *tricarinata* (Tarbinsky, 1930).

#### 5) *Montana* Zeuner, 1941 (Figs. 3, 5, 72, 73, 82, 83, 108)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.1–1.2. Pronotum clearly depressed, humeral excision just evident, keel present in metazona; ♀ subgenital plate simple or bilobate, broad; ovipositor not laterally compressed (*Decticus*-type) > ½ hind femur, whitish; ♀ VI–VII<sup>th</sup> sternites not modified; hind femora/pronotum length ♂♀: 4.0–4.4; ♂ X<sup>th</sup> tergite with two short pointed or large and flat processes. Basal arms of titillators with spines. Colour of lateral lobes of the pronotum is black bordered with a white stripe.

**Remarks.** These characteristics permit easy the separation from *Platycleis* (type of pronotum excision and ovipositor shape), as well as from *Tessellana*. Çiplak *et al.* (2002) consider this taxon heterogeneous, mainly for length of tegmina, shape of male cerci and of female subgenital plate. We agree with them; in fact, tegmina may be abbreviated in some species, but in other they are developed, pronotum shape and the subgenital plate of female are much variable. Consequently, some species have been tentatively assigned to this taxon; when more material is available and the relationships among different taxa clearer, the assignment of some of them to it or another taxon will be possible. *Montana ankarensis* has been transferred to *Squamiana* by Ünal (2006) (cf. *Squamiana*). Concerning *Montana decticiformis*, we examined a Georgian female specimen (Figs. 5, 73, 83; measurements in mm: total length: 27.7; pronotum length: 7.0; length of hind femora: 26.1; length of tegmina: 20.5; ovipositor length: 14.5), which shows characteristics quite different from other taxa belonging to *Montana*; in particular, side sclerites are placed between the subgenital plate and VII<sup>th</sup> sternite, pronotum looks very much alike that of *Platycleis*, with a

very pronounced humeral excision and developed metazona; in addition, size of this species is much larger and the ovipositor is much stouter than in other species of *Montana*, and the ratio hind femora/pronotum length (3.7) lies below the average of the genus. We think that when much material will be available, this species should be transferred to another taxon.

**Distribution.** It covers from E Asia to W Europe.

**Number of species known** (after Eades *et al.* 2010): 21: 1) *armeniaca* (Zeuner, 1930); 2) *barretii* (Burr, 1912); 3) *carpetana* (Bolivar, 1887); 4) *daghestanica* (Uvarov, 1917); 5) *decticiformis* (Stshelkanovtzev, 1914) (it probably does not belong to *Montana*; specimen examined: ♀, Georgia, Caucasus, Mts'Khet'a, Dzvag (619 m), Cross Monastery 4.VII.2003, F.M.Buzzetti, P.Fontana & B.Massa); 6) *elegans* (Uvarov, 1934); 7) *eversmanni* (Kittary, 1849); 8) *heinrichi* (Ramme, 1929); 9) *helleri* (Çiplak et Taylan, 2006); 10) *kure* (Ünal, 2006); 11) *macedonica* (Berland et Chopard, 1922); 12) *medvedevi* (Miram, 1927); 13) *montana* (Kollar, 1833) (type species); 14) *richteri* (Bei-Bienko, 1958); 15) *schereri* (Werner, 1905); 16) *striata* (Thunberg, 1815); 17) *stricta* (Zeller, 1849); 18) *taurica* (Bolivar, 1899); 19) *tianshanica* (Uvarov, 1933); 20) *tomini* (Pylnov, 1916); 21) *uvarovi* Karabag, 1950.

## 6) *Pravdiniana* Sergeev et Pokivajlov, 1992 (Figs. 20, 77, 81)

**Characters.** Pronotum moderately elongated, dorsally weakly depressed, with indistinct lateral keels, median keel raised on metazona; humeral excision absent. ♀ subgenital plate elongated, with two lobes separated by a wide furrow; ovipositor short, its length is twice pronotum, curved at base at obtuse angle, ca.  $\frac{1}{2}$  hind femur; ♀ VI–VII<sup>th</sup> sternites modified; hind femora/pronotum length ♀: 3.2–3.5; ♂ unknown. Colour of lateral lobes of the pronotum is grayish bordered with a whitish stripe.

**Remarks.** The only species known is squamipterous. The shape of the pronotum, ovipositor and ♀ subgenital plate are very characteristic; only one species has been described from Tajikistan, of which only the female is known (Sergeev & Pokivajlov 1992).

**Distribution.** Tajikistan.

**Note.** This genus was named after the Russian orthopterist G.N. Pravdin.

**Number of species known** (after Eades *et al.* 2010): 1) *mira* Sergeev et Pokivajlov, 1992 (type species).

## 7) *Modestana* Beier, 1955 (Figs. 6, 56, 97, 109)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.1–1.2. Macropterous to squamipterous, pronotum rounded, humeral excision absent, keel not evident; ♀ subgenital plate smooth with a deep excision of the hind margin; ovipositor whitish, long and gently curved upwards; ♀ VI–VII<sup>th</sup> sternites not modified; hind femora/pronotum length ♂: 3.8–4.0, ♀ 3.8–4.1; ♂ X<sup>th</sup> tergite with two pointed processes, separated by a wide incision, cerci apically flattened. Titillators slender and smooth. Colour of lateral lobes of the pronotum is blackish bordered with a white stripe.

**Distribution.** From Balkan peninsula to Italy.

**Number of species known** (after Eades *et al.* 2010): 3: 1) *ebneri* (Ramme, 1926); 2) *kraussi* (Padewieth, 1900); 3) *modesta* (Fieber, 1853) (type species).

## 8) *Parnassiana* Zeuner, 1941 (Figs. 8, 60, 95, 119)

**Characters.** Micropterous, pronotum rounded, humeral excision absent, hind border of pronotum not exceeding the mesonotum, keel present; pronotum short (ratio length/height of pronotum ♂♀: 1.2–1.3). ♀ subgenital plate with smooth rounded lobes; ovipositor whitish regularly curved, ca. 2.0–2.2 as long as pronotum, thick at the base, not laterally compressed; ♀ VI–VII<sup>th</sup> sternites not modified; hind femora very short, hind femora/pronotum length ♂: 2.2–2.5, ♀: 2.3–2.6; ♂ X<sup>th</sup> tergite broadly depressed in middle and deeply incised, lobes large and long. Colour of lateral lobes of the pronotum is blackish-gray bordered with a white stripe.

**Remarks.** Well characterized by short hind femora, male X<sup>th</sup> tergite, and ovipositor not laterally compressed (see below).

**Distribution.** It covers Balkan peninsula; the species living in Mediterranean France, described as *P. vicheti*, belongs to another taxon and its affinity to *Parnassiana* seems only a phenomenon of convergence.

**Number of species known** (after Eades *et al.* 2010, modified): 13: 1) *chelmos* Zeuner, 1941; 2) *coracis* (Ramme, 1921); 3) *dirphys* (Willemse, 1980); 4) *fusca* (Brunner von Wattenwyl, 1882); 5) *gionica* La Greca et Messina, 1976; 6) *menalon* (Willemse, 1975); 7) *nigromarginata* (Willemse et Willemse, 1987); 8) *panaetolikon* (Willemse, 1980); 9) *parnassica* (Ramme, 1926) (type species); 10) *parnon* (Willemse, 1980); 11) *tenuis* (Heller, 1988); 12) *tymphiensis* (Willemse, 1973); 13) *tymphrestos* Zeuner, 1941.

### 9) *Amedegnatiana* new genus (Figs. 10, 58, 96, 120)

*Parnassiana vicheti* from Mediterranean France has been tentatively ascribed to *Parnassiana* (cf. Delmas & Rambier 1950; Chopard 1951), but its affinity with Balkan *Parnassiana* is questioning and recently Heller (2006) has hypothesized that it probably belongs to a different taxon. It shows the pronotum comparatively longer than other species of *Parnassiana* and other characters which consent to treat it within a separate taxon. Additionally, its song is more related to a *Metrioptera* than to a *Parnassiana* (K.-G. Heller, pers. comm.). Thus, we consider the French taxon not belonging to any described genus and name it *Amedegnatiana* new genus.

**Description.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.1–1.2. Micropterous, pronotum is comparatively longer than in taxa ascribed to *Parnassiana* (ratio length/height of pronotum ♂♀: 1.4–1.5), flat, humeral excision just evident, hind border of pronotum well protruding over the metanotum, keel present. ♀ subgenital plate has a just incised hind margin and the ovipositor is stout and greyish, ca. 1.3–1.4 as long as pronotum and laterally compressed. ♀ VI–VII<sup>th</sup> sternites are not modified; hind femora very short, hind femora/pronotum length ♂♀: 2.3–2.4; ♂ X<sup>th</sup> tergite depressed in middle and deeply incised, processes are triangularly pointed. Cerci are rounded and provided with an inner teeth in the fourth portion. Titillators folded at right angle, their basal arms with spines. Colour of lateral lobes of the pronotum is black bordered with a white stripe.

**Derivatio nominis.** The genus is named after the late French orthopterist Christiane Amedegnato, who some years ago nicely received us in the Museum of Natural History of Paris.

**Remarks.** Well characterized by long metazona, humeral excision just evident, very short hind femora, male processes of X<sup>th</sup> tergite, female subgenital plate and short and stout ovipositor.

**Number of species known:** 1) *vicheti* (Delmas et Rambier, 1950) (type species) (specimens examined: 3 males and 4 females from Hérault, France).

### 10) *Alticolana* Zeuner, 1941 (Figs. 7, 59)

**Characters.** Micropterous, pronotum rounded, excision just evident, median keel more or less evident; ♀ subgenital plate small, straight on hind margin, raised in the middle near the base, with a shallow comma-shaped furrow; ovipositor ca. ½ hind femur, well curved upwards; ♀ VII<sup>th</sup> sternite enlarged, with two sublateral tubercles; hind femora/pronotum length ♂♀: 3.1–3.3; ♂ X<sup>th</sup> tergite with short processes, in the middle with a narrow longitudinal groove behind hind margin carinate, cerci cylindrical with pre-apical tooth. Colour of lateral lobes of the pronotum is blackish-grey bordered with a white stripe.

**Distribution.** Central Asia.

**Remarks.** This altomontane genus is probably related to *Squamiana*. Bei-Bienko (1951) described two species of ‘*Metrioptera*’, *atroflava* and *crassipes*; while he included the former in the subgenus *Alticolana*, was not able to decide the supraspecific taxon of the latter (of which only the female was available) and wrote *Metrioptera* (?) *crassipes*, because it was characterized by the subgenital plate transverse, smooth, with straight hind margin, seeming obtuse emarginate from below. In addition, Bei-Bienko (1951) pointed out that it was a little related to *Eumetrioptera* by its short hind femora (hind femora/pronotum length: 2.1–2.4); the ovipositor shape is similar to that of *Pravdiniana*, but the subgenital plate is different from it. Ragge (1990) correctly included only two species within the taxon *Alticolana*, *alticola* and *atroflava*. The first author who listed *crassipes* within *Alticolana* was Otte (1997), followed by Eades & Otte (2008) and Eades *et al.* (2010). We think that this species does not belong to *Alticolana*, but in the absence of the male, we leave it in this genus.

**Number of species known** (after Eades *et al.* 2010): 3: 1) *alticola* (Tarbinsky, 1930) (type species); 2) *atroflava* (Bei-Bienko, 1951); 3) *crassipes* (Bei-Bienko, 1951) (it probably does not belong to *Alticolana*).

### 11) *Squamiana* Zeuner, 1941 (Figs. 18, 19, 61, 63, 99, 100, 121–123, 133–138)

**Characters.** Head as large as long, ratio maximum width/length of head (from vertex to clipeus): 1.0. Squamipterous, pronotum rounded, slightly raised in the prozona, humeral excision just evident, median keel evident in the metazona; ♀ subgenital plate with or without median furrow and right or incised at hind margin, lateral lobes rounded; ovipositor ca. ½ hind femur, thin, stout and strongly upcurved, similar to that of *Platycleis*; ♀ VI–VII<sup>th</sup> sternites widely raised; hind femora/pronotum length ♂: 2.6–4.3, ♀: 2.8–3.7; ♂ X<sup>th</sup> tergite with two more or less pointed short processes, cerci are just flattened. Basal arms of titillators with strong spines (only in *S. ankarensis* and *S. kurmana* there are small spines). Colour of lateral lobes of the pronotum is greyish or blackish; the white stripe is more or less distinct.

**Remarks.** *Squamiana* species are associated with steppic zones of medium-high mountains (Tarbinsky 1939, Pravdin 1969, Çiplak *et al.* 2002). The female of the type species (*S. squamiptera*) is characterized by the last tergite widely incised (Uvarov 1912). The genus appears heterogeneous and some species considered belonging to this taxon possibly should be better assigned to another one. Çiplak *et al.* (2002) pointed out that *Montana ankarensis* differs from other species of the same taxon by ovipositor type (basely light and dark in the rest, thick and more strongly upcurved) and wings shorter than pronotum. Somewhat similar to the *Squamiana* by ovipositor type, it differs, however, by unmodified VI and VII<sup>th</sup> sternites of female and apically wide tegmina. However, even though they were aware that this species does not belong to any described taxon, decided to maintain it within *Montana*. Afterwards, Ünal (2006) transferred it from *Montana* to *Squamiana*, mainly on the base of the shape of very shortened tegmina, the dark colour of ovipositor, except its base, and its shape (high, compressed and more upcurved).

**Distribution.** Central Asia to Turkey.

**Number of species known** (after Eades *et al.* 2010, modified): 9, including a new species from Uzbekistan below described: 1) *ankarensis* (Karabag, 1950); 2) *bressani* Fontana et Massa, present paper; 3) *irritans* Ramme, 1951; 4) *kurmana* Ramme, 1951; 5) *melendisensis* (Çiplak, 2002); 6) *salmani* (Çiplak, 2002); 7) *sinuata* Ramme, 1951; 8) *squamiptera* (Uvarov, 1912) (type species); 9) *weidneri* (Demirsoy, 1974).

### *Squamiana bressani* Fontana et Massa n. sp. (Figs. 19, 63, 100, 123, 133–140)

**Examined material and type depository:** ♂ holotype, ♀ paratype: Uzbekistan, Chimgand Peak in Chatkal Range on border of Kirghiz, c. 90 km. NE Tashkent, c. 2000 m., 16.VIII.1968, leg. T. H. Hubbell (PFCV).

**Diagnosis.** *Squamiana bressani* n. sp. is a medium sized species clearly different from all other species of the genus by the following characters: male digitiform cerci, male X<sup>th</sup> tergite not incised in the middle, female subgenital plate with a median wide rectangular incision.

**Male description.** Ground coloured, light brown-grey with black markings over eyes, lateral lobes of pronotum brown, blackish near the wide whitish margin; tegmina ivory with dark longitudinal veins and few dark elongated spots between veins; transversal veins not dark; hind femora with two rows of small dark marking at basal half. Abdomen clear brown. Head stout, eyes scarcely prominent. Fastigium as wide as the maximum eye diameter. Pronotum with dorsal surface flat, laterally compressed in the prozona, keeled on metazona; humeral excision on hind margin of lateral lobes barely detectable and placed almost at 3/4 of total pronotum length. Brachypterous, tegmina as long as pronotum, suboval, with rounded apex, with few dark longitudinal veins, and thin, barely detectable transversal veins. X<sup>th</sup> tergite produced backwards in a subtriangular process longitudinally grooved in the middle, but not divided. Cerci digitiform, more or less cylindrical, tapering to the rounded apex after inner tooth. The inner tooth is situated slightly behind the end of second third. Subgenital plate subtrapezoidal with hind margin v-incised between styli and bearing two keels on posterior half in correspondence of styli that are cylindrical and elongated. Titillators small, symmetrical, basal portion rounded and curved upwards, distal portion swelling at the base and decidedly tapering toward apex, ventrally armed with a toothed keel and apically hooked.

**Female description.** Ground coloured, light brown-grey with black markings over eyes, dorsal surface of pronotum green, lateral lobes brown, blackish near the wide whitish margin; tegmina ivory with dark longitudinal veins

and dark spots between veins; transversal veins not dark; hind femora with two rows of dark marking at basal half. Abdomen clear brown with dark vanishing bands on sides of first tergites. Head stout, eyes scarcely prominent. Fastigium as wide as the maximum eye diameter. Brachypterous, tegmina shorter than pronotum, suboval, with rounded apex, few dark longitudinal veins, and thin, barely detectable transversal veins. Last abdominal tergite deeply and widely incised in the middle. Cerci conical, pointed. VI<sup>th</sup> sternite gently swollen on apical third, VII<sup>th</sup> with a low smooth transversal keel in the middle and transversally wrinkled before and behind. Subgenital plate short, subtrapezoidal, with a median wide rectangular incision forming two small lateral lobes apically rounded. Ovipositor as long as pronotum and tegmina together, gently upcurved, light coloured on basal fifth and black in the distal half; apex not crenulated at all.

**Measurements** (in mm). Male. Total length from the head to the apex of abdomen: 19.42; from the head to the apex of hind femur: 30.4; pronotum length: 6.72; pronotum height: 4.16; length of tegmina: 5.6; length of hind femora: 19.36; height of hind femora: 4.0; cercus length: 2.23; hind femora/pronotum length: 2.88. Female. Total length from the head to the apex of abdomen: 22.4; from the head to the apex of hind femur: 32; pronotum length: 6.72; pronotum height: 4.0; length of tegmina: 5.28; length of hind femora: 19.52; height of hind femora: 4.0; length of ovipositor: 10.56; hind femora/pronotum length: 2.90.

**Derivatio nominis:** we are glad to name this new species after our Italian friend, the musician Paolo Bressan from Isola Vicentina, lover of Mediterranean and Middle Eastern music.

**Affinities.** *S. bressani* n. sp. is clearly different from all yet described *Squamiana*. It differs from *S. squamiptera* by the structure of X<sup>th</sup> tergite and cerci of the male, of the VI-VII<sup>th</sup> sternites and the peculiar shape of subgenital plate of female, from *S. irritans* by the shape of male cerci, while shows a similar shape of the X<sup>th</sup> tergite of male; in addition it may easily be distinguished from *S. ankarensis*, *S. melendisensis*, *S. salmani*, *S. sinuata*, *S. kurmania* and *S. weidneri* (according to Çiplak *et al.* (2002) a possible synonym of *S. sinuata*) by the shape of cerci, titillators and X<sup>th</sup> tergite of male (cf. also Çiplak *et al.* 2002, Ünal 2006).

## 12) *Yalvaciana* Çiplak, Heller et Demirsoy, 2002

**Characters.** Micropterous, pronotum depressed dorsally, with rounded lateral edges, median keel distinct in the metazona; tegmina apically broad. ♀ subgenital plate bilobate, wide-deeply incised; ovipositor weakly curved toward apex; ♀ VI-VII<sup>th</sup> sternites not modified; hind femora/pronotum length ♂♀: 3.5-4.2; ♂ X<sup>th</sup> tergite with two evident processes, cerci with a spine in distal half and another at apex. Titillators with teeth on apical arms, smooth on basal arms. Colour of lateral lobes of the pronotum is black bordered with a white stripe.

**Remarks.** The only species known was previously considered to belong to *Decorana* (Ragge 1990), but recently has been included within a subgenus of *Platycleis* (Çiplak *et al.* 2002); it does not show the excision on the lateral lobes of the pronotum (typical of *Platycleis*) and male cerci bear another spine at the apex. Also the titillators are characteristic.

**Distribution.** Turkey.

**Number of species known** (after Çiplak *et al.* 2002): 1) *yalvaci* (Demirsoy, 1974) (type species).

## 13) *Sphagniana* Zeuner, 1941 (Figs. 25, 57, 98, 111)

**Characters.** Tegmina are generally abbreviated, but rarely macropterous individuals are found. Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.2-1.3. Pronotum depressed, widened and enlarged in the metazona, with lateral lobes bent down at a sharp angle (mainly in males), median keel obliterated; hind femora comparatively short and weak; ♀ subgenital plate very small, wider than long; ovipositor slender, long and regularly curved near the base; hind femora/pronotum length ♂: 2.4-2.5, ♀: 2.6-3.0; ♂ X<sup>th</sup> tergite enlarged, incised in the middle and with two very expanded lobes completely covering cerci; cerci just flattened in the inner spine portion. Colour of lateral lobes of the pronotum is black bordered with a white stripe.

**Remarks.** It is evidently separated from all here considered taxa by its characteristic male processes covering cerci, its pronotum shape and relative short femora. These characters consents definitely to separate it from *Metrioptera*, by some authors considered its synonym. It has been listed by Rentz & Colless (1990) within the subgenera of *Metrioptera*, but Eades *et al.* (2010) consider it a valid genus. We examined only *S. sphagnorum*, thus we are not

able to establish if the other two species reported within this genus have the same characteristics or they should be classified in another way. We only observe that *S. ussuriana* shows a different pronotum and ovipositor pattern. Previously, Ramme (1951) wrote that the classification of *Sphagniana* and *Alticolana* was not clear and their species appeared much heterogeneous, some of them probably belonging to other genera.

**Distribution.** It is the only taxon, among those here considered, covering E Asia and N America.

**Number of species known** (after Eades *et al.* 2010): 3: 1) *monticola* (Kim et Kim, 2001); 2) *sphagnorum* (Walker, 1869) (type species); 3) *ussuriana* (Uvarov, 1926).

#### 14) *Eobiana* Bei-Bienko, 1949 (Figs. 26, 55, 91)

**Characters.** Brachypterous, pronotum just excised, flat, median keel present in metazona; ♀ subgenital plate longer than wide, with a basal keel, side sclerites large, fused with the subgenital plate, apical lobes pointed and deeply incised; ovipositor black, stout, short and regularly curved; hind femora/pronotum length ♂: 3.4-3.8, ♀: 3.2-3.9; ♂ X<sup>th</sup> tergite incised in the middle, with pointed processes (they may be well separated or semicircularly close); cerci just flattened, rounded and pointed after the inner tooth. Titillators a little divergent, apically hooked. Colour of lateral lobes of the pronotum is blackish; the white stripe is more or less distinct.

**Remarks.** Zeuner (1941) included within *Metrioptera* all species until then known; Bei-Bienko (1949) described *Eobiana* as subgenus of *Metrioptera*, but Storozhenko & Yamasaki (1993) raised it to generic status, including only two species. Ishikawa & Wada (2001) considered it as a valid genus and described other three species. *Eobiana* may be considered the Japanese and East Asian representative of *Metrioptera*, from which it differs by the shape of male processes, ovipositor and female subgenital plate.

**Distribution.** E Asia and Japan.

**Number of species known** (after Eades *et al.* 2010): 5: 1) *engelhardtii* (Uvarov, 1926); 2) *gladiella* Ishikawa, 2001; 3) *japonica* (Bolivar, 1890) (type species); 4) *nagashimai* Wada et Ishikawa, 2001; 5) *nippomontana* Ishikawa et Wada, 2001.

#### 15) *Metrioptera* Wesmael, 1838 (Figs. 28, 51, 87, 112)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.2-1.3. Tegmina are generally abbreviated, pronotum flat, keeled in the metazona, borders rounded, humeral excision just evident; ♀ subgenital plate more or less bilobate, broad, without median furrow; ovipositor slender, long and regularly curved upwards; ♀ VI-VII<sup>th</sup> sternites not modified; hind femora/pronotum length ♂♀: 3.5-4.0; ♂ X<sup>th</sup> tergite with two short pointed processes, cerci flattened. Colour of lateral lobes of the pronotum is blackish-grey bordered with a whitish stripe.

**Remarks.** It has been unanimously considered a separated genus from *Platycleis*. *Bicolorana* and *Roeseliana* are closely well related to *Metrioptera*, but their ♀ subgenital plate and the ♂ X<sup>th</sup> tergite of *Roeseliana* provide good characters to separate the three taxa. According to Ragge & Reynolds (1998) songs do not consent to separate *M. saussuriana*, *M. buyssoni* and *M. caprai*.

**Distribution.** From N to S Europe and Asia.

**Number of species known** (after Eades *et al.* 2010): 11: 1) *ambigua* Pfau, 1986; 2) *brachyptera* (Linnaeus, 1761) (type species); 3) *buyssoni* (Saulcy, 1887); 4) *caprai* Baccetti, 1956; 5) *hoermannii* (Werner, 1906); 6) *karnyana* Uvarov, 1924; 7) *maritima* Olmo-Vidal, 1992; 8) *oporina* (Bolivar, 1887); 9) *prenjica* (Burr, 1899); 10) *saussuriana* (Frey-Gessner, 1872); 11) *tsirojanni* Harz et Pfau, 1983.

#### 16) *Bicolorana* Zeuner, 1941 (Figs. 29, 53, 93, 114)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.1-1.2. Tegmina are generally abbreviated, but sometimes macropterous individuals of some species are found. Pronotum flat, just depressed, borders rounded, humeral excision just evident, keel present in the metazona; ♀ subgenital plate

longer than wide, attenuated to the apex and incised, at the sides not touching the ovipositor; ovipositor comparatively short and thick, bent upwards beyond the apex of the subgenital plate; ♀ VI-VII<sup>th</sup> sternites modified or not; hind femora long and slender, hind femora/pronotum length ♂♀: 3.7-3.8; ♂ X<sup>th</sup> tergite with two apical pointed processes, cerci long and apically flattened. Colour of lateral lobes of the pronotum is greenish; the whitish stripe is indistinct.

**Distribution.** Central and E to NE Europe.

**Number of species known** (after Eades *et al.* 2010): 3: 1) *bicolor* (Philippi, 1830) (type species); 2) *burri* (Uvarov, 1921); 3) *kuntzeni* (Ramme, 1931).

### 17) *Vichetia* Harz, 1969 (Figs. 27, 92, 115)

**Characters.** Micropterous, pronotum flat, just depressed, humeral excision just evident, keel present in metazona; ♀ subgenital plate as broad as long or broader than long, with a basal keel, side sclerites large, fused with the subgenital plate; ♀ VI<sup>th</sup> sternite with a hook; ovipositor slender, curved upwards in the basal third; hind femora/pronotum length ♂♀: 3.1-3.6; ♂ X<sup>th</sup> tergite with pointed processes, cerci rounded. Colour of lateral lobes of the pronotum is blackish bordered with a white stripe.

**Distribution.** E Europe to Turkey.

**Note.** This genus was named after the French orthopterist G. de Vichet.

**Number of species known** (after Eades *et al.* 2010): 3: 1) *helleri* (Schmidt, 1998); 2) *knipperi* (Ramme, 1951); 3) *oblongicollis* (Brunner von Wattenwyl, 1882) (type species).

### 18) *Broughtonia* Harz, 1969 (Figs. 32, 89, 116)

**Characters.** Micropterous, pronotum flat, just depressed, humeral excision just evident, keel present in metazona; ♀ subgenital plate with a deep triangular incision of the apex; ovipositor rather curved upwards; hind femora/pronotum length ♂: 3.3-3.8, ♀: 3.4-3.6; ♂ X<sup>th</sup> tergite semicircularly emarginate, spine-shaped, cerci long and flattened in the apical third. Colour of lateral lobes of the pronotum is greyish; the whitish stripe is indistinct.

**Distribution.** E Europe.

**Number of species known** (after Eades *et al.* 2010): 2: 1) *arnoldi* (Ramme, 1933); 2) *domogledi* (Brunner von Wattenwyl, 1882) (type species).

### 19) *Roeseliana* Zeuner, 1941 (Figs. 30, 52, 86, 88, 113)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.2-1.3. Micropterous, pronotum flat, just depressed, borders rounded, humeral excision just evident, keel present in the metazona; ♀ subgenital plate large, bilobate, at the sides not touching the ovipositor; ovipositor short and clearly curved, somewhat angular at 1/3 from the base; ♀ VII<sup>th</sup> sternite modified or not; hind femora/pronotum length ♂: 2.7-3.5, ♀: 2.7-3.6; ♂ X<sup>th</sup> tergite with very broad processes separated by an incision, long cylindrical cerci. Colour of lateral lobes of the pronotum is greyish bordered with a whitish stripe.

**Remarks.** X<sup>th</sup> tergite of male with very broad anal segment, rounded cerci and short ovipositor are good characters to separate it from *Metrioptera* and *Bicolorana*; with the latter *Roeseliana* shares the female subgenital plate not touching the ovipositor.

**Distribution.** Central and S Europe to central Asia; *R. roeselii* has been introduced in N America (Capinera *et al.* 2004).

**Note.** This genus was named after the Austrian entomologist August Johann Rösel von Rosenhof.

**Number of species known** (after Eades *et al.* 2010, modified): 7 (in parentheses specimens examined): 1) *ambitiosa* (Uvarov, 1924); 2) *azami* (Finot, 1892) (35 males and 30 females from NW Italy and France); 3) *bispina* (Bolívar, 1899); 4) *brunneri* Ramme, 1951 (18 males and 20 females from NE Italy); 5) *fedtschenkoi* (Saussure, 1874) (4 males and 4 females from Armenia); 6) *pylnovi* (Uvarov, 1924); 7) *roeselii* (Hagenbach, 1822) (type species) (35 males and 30 females from Italy, Poland, Germany, Croatia, Romania and Vermont, USA).

**Taxonomical note.** Some authors (e.g. Heller 1988, Ragge & Reynolds 1998, Eades *et al.* 2010) consider *R. azami* as subspecies of *R. roeselii* or *R. fedtschenkoi* or the latter as conspecific taxa; while *R. fedtschenkoi* is related to *R. roeselii* (they differ by titillators and female subgenital plate shape), *R. azami* is a valid species, different from congeneric ones for the following characters: ♂ X<sup>th</sup> tergite with very long, broad and triangular processes (in *R. roeselii* they are shorter, less pointed and adjacent, in *R. brunneri* they are very large and separated by a wide incision), tooth of cerci short, rounded and placed in the last fourth (as in *R. brunneri*, while in *R. roeselii* and in *R. fedtschenkoi* they are longer, placed in the last third and are more pointed); titillators of *R. azami* are similar to those of *R. brunneri* (folded as a hook), while those of *R. roeselii* show a very different shape (straight with apical spines); in addition, the ♀ subgenital plate of *R. azami* is as large as long, incised for half the length and its lobes are rounded (similarly to that of *R. brunneri*), while that of *R. roeselii* is laterally enlarged and its lobes are pointed (cf. also Ramme 1951, Fontana 2001, and Figs. 86, 88, 113).

## 20) *Zeuneriana* Ramme, 1951 (Figs. 31, 90, 110)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.1–1.2. Micropterous, pronotum flat, borders rounded, humeral excision just evident, keel present in the metazona; ♀ subgenital plate with hind margin broadly and deeply emarginate, terminal lobes long; ovipositor short, stout; hind femora/pronotum length ♂: 2.7–3.1, ♀: 3.0–3.5; ♂ X<sup>th</sup> tergite broad, incised in the middle, with two short triangular processes, cerci short, stout and toothed at the base or proximally. Colour of lateral lobes of the pronotum is blackish or greenish; the white stripe is absent.

**Remarks.** ♀ subgenital plate and ♂ X<sup>th</sup> tergite consent to separate it from related taxa (cf. also Kleukers *et al.* 1997).

**Distribution.** S Europe.

**Note.** This genus was named after the Anglo-German orthopterist F. E. Zeuner.

**Number of species known** (after Eades *et al.* 2010): 4: 1) *abbreviata* (Serville, 1838); 2) *amplipennis* (Brunner von Wattenwyl, 1882); 3) *burriana* (Uvarov, 1935); 4) *marmorata* (Fieber, 1853) (type species).

## 21) *Sepiana* Zeuner, 1941 (Figs. 21, 50, 94, 118)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.1–1.2. Micropterous, pronotum rounded, laterally triangular, humeral excision absent, keel not evident; ♀ subgenital plate very short, depressed and provided with a wide emargination; ovipositor regularly recurved; ♀ VI–VII<sup>th</sup> modified; hind femora very long, hind femora/pronotum length ♂♀: 3.9–4.2; ♂ X<sup>th</sup> tergite with two short processes, cerci broad and flattened. Basal arms of titillators with spines. Colour of lateral lobes of the pronotum is blackish bordered with a white stripe.

**Remarks.** Zeuner (1941) also included within this taxon species later transferred to the genus *Modestana* Beier, 1955; pronotum shape is the only character similar in the two taxa. It has been treated at genus level by Harz (1969) and Heller *et al.* (1998), while others have included it within the subgenera of *Platycleis*. The particular shape of the pronotum, the shortness of the female subgenital plate, the shape of male cerci and processes of the ♂ X<sup>th</sup> tergite are not shared by other taxa.

**Distribution.** From W Europe to Mediterranean (excluded N Africa) and Turkey.

**Number of species known** (after Eades *et al.* 2010): 1) *sepium* (Yersin, 1854) (type species).

## 22) *Sporadiana* Zeuner, 1941 (Figs. 22, 75)

**Characters.** Micropterous, pronotum rounded, median keel not evident; ovipositor curved at the base, thence straight, long and slender; large and gibbous ♀ VI sternite; hind femora very short, hind femora/pronotum length ♂♀: 2.2–2.5; ♂ X<sup>th</sup> tergite with two wide processes. Basal arms of titillators with spines. Colour of lateral lobes of the pronotum is blackish bordered with a whitish stripe.

**Remarks.** As *Parnassiana*, it is well characterized by short hind femora; additionally, the male X<sup>th</sup> tergite shows two wide processes. The sole species known has been listed within *Tessellana* by Ragge (1990) and Ingrisch & Pavićević (1985), but Ciplak *et al.* (2002) have shown that characters of *Sporadiana* justify the treatment as a separate taxon; according to Ünal (2006) it is related to *Rammeola*.

**Distribution.** From Balkan peninsula to Turkey.

**Number of species known** (after Eades *et al.* 2010): 1) *sporadarum* (Werner, 1933) (type species).

### 23a) *Incertana* Zeuner, 1941 (Figs. 40, 42, 65, 67, 103, 132, as *Decorana*)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.0–1.1. Micropterous, pronotum flat in the prozona, more or less rounded, humeral excision just evident, median keel more or less obliterated; ♀ subgenital plate hardly incised, with median carina in a very shallow depression, as wide as long; ovipositor suddenly recurved at base and thence straight or very nearly straight and slender, ca. ½–¾ hind femur. ♀ VII<sup>th</sup> sternite with round or transverse bulge; hind femora/pronotum length ♂♀: 3.3–4.2; ♂ X<sup>th</sup> tergite with two long processes which may reach the apex of cerci. Basal arms of titillators with spines. Colour of lateral lobes of the pronotum is very variable, from greyish to blackish bordered with a narrow or wide white stripe.

**Remarks.** Some authors list the species belonging to *Incertana* within the genus *Tessellana* (e.g. Heller *et al.* 1998, Eades *et al.* 2010). *Incertana* does not show the humeral excision on the pronotum, its median keel is not as evident as in *Tessellana*, male processes are longer and the subgenital plate of the female is different from that of *Tessellana*, which is very uniform in all its species, also characterized by a well modified VII<sup>th</sup> sternite. Only the ovipositor of *Incertana* is a little similar to that of *Tessellana*, but in *Tessellana* is black with a whitish base, while in *Incertana* is brownish. Additionally, eggs of *Incertana* are brown, while those of *Tessellana* are black.

*Incertana* and *Decorana* are very much related. The ovipositor of *Decorana* is very variable, from slender, almost straight and long (e.g. *D. tripolitana*, *D. buxtoni*) to clearly bent upwards, short and stout (e.g. *D. seniae*, *D. himalayana*). On the other hand, the *Incertana* ovipositor is short, stout and bent upwards. Concerning the ♀ subgenital plate, *Decorana* may exhibit a clearly bilobate apex (e.g. *D. seniae*, *D. decorata*, *D. drepensis*, *D. kabila*, *D. capitata*), as well as a truncate apex (e.g. *D. buxtoni*), which appears very different from the previous one. The *Incertana* ♀ subgenital plate is generally apically straight and characterized by a small median keel (also present in *D. buxtoni*).

Finally, the ♂ X<sup>th</sup> tergite of *Decorana* varies from two short pointed lobes, separated by a wide excision (e.g. *D. decorata*, *D. kabila*, *D. drepensis*) to more or less long pointed processes (e.g. Middle Eastern *D. buxtoni*, Maghrebi *D. seniae*), and also cerci may be of variable shape, from pointed to rounded. *D. buxtoni* is the species of this systematic group showing the longest processes (cf. Broza *et al.* 2004); it is also the type species of *Decorana* (and the most atypical *Decorana*, too), and shares with *Incertana* the length of processes of the male X<sup>th</sup> tergite, recorded by Zeuner (1941) as characteristic of the latter taxon (“almost reach the apex of cerci”). A part from the length of hind femora (longer in *Incertana* compared with *Decorana*), it seems that the keel of the female subgenital plate is the only character that implies the separation of *Incertana* from *Decorana*. For this reason we consider *Incertana* and *Decorana* to be synonyms.

**Distribution.** From Balkan peninsula to Middle East (from Turkey to Iran).

**Number of species known** (after Eades *et al.* 2010, modified): 3 (see *Decorana*).

### 23b) *Decorana* Zeuner, 1941 (Figs. 33–42, 65–71, 102–103, 105, 127–132)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.0–1.1. Micropterous to brachypterous, pronotum rounded, just flat on metazona, borders rounded, humeral excision just evident, median keel more or less obliterated; ♀ subgenital plate more or less bilobate, emarginate at the apex, as long as wide; ovipositor suddenly recurved at base and thence straight or very nearly straight and slender, ca. ½–¾ hind femur; ♀ VI–VII<sup>th</sup> sternites not modified; hind femora/pronotum length ♂: 3.1–3.5, ♀: 3.2–3.9; ♂ X<sup>th</sup> tergite with two more or less long processes. Basal arms of titillators with spines. Colour of lateral lobes of the pronotum is very variable, from greyish to blackish bordered with a narrow or wide white stripe.

**Remarks.** Only the female of the *D. himalayana* species is known; its subgenital plate is a bit atypical, and together with the Nepalese *D. concinna*, it is brachypterous. Zeuner (1941) considered this taxon heterogeneous (for other details see above, under *Incertana*). Also Ramme (1951, note 1, p. 258) considered that species classified within *Decorana* were heterogeneous, and some of them probably belonged to other genera; however, he did not see specimens of this taxon. The shape of the pronotum convinced Harz (1969) to consider it as a subgenus of *Metrioptera*, but Heller *et al.* (1998) reinstated it as a genus, while others treated it as a subgenus of *Platycleis*. For the reasons reported on *Incertana*, we list within the genus *Decorana* the species hitherto classified as *Incertana*.

**Distribution.** From Iberian peninsula through N Africa and Sicily to Arabian peninsula, Nepal and Himalaya.

**Number of species known** (after Eades *et al.* 2010): 10 + 3 previously considered *Incertana*: 1) *arabica* (Popov, 1981); 2) *buxtoni* (Uvarov, 1923); 3) *capitata* (Uvarov, 1917); 4) *chopardi* (Jannone, 1936); 5) *concinna* (Walker, 1869); 6) *decorata* (Fieber, 1853) (type species of *Decorana*); 7) *drepanensis* (Massa, Fontana et Buzzetti, 2006); 8) *himalayana* (Ramme, 1933); 9) *incerta* (Brunner von Wattenwyl, 1882) (type species of *Incertana*); 10) *kabila* (Finot, 1893); 11) *persica* (Uvarov, 1917); 12) *seniae* (Finot, 1893); 13) *tripolitana* (Fontana et Massa, 2009).

#### 24) *Eumetrioptera* Miram, 1935 (Figs. 24, 62, 85)

**Characters.** Micropterous, pronotum rounded, not excised, almost laterally triangular, median keel obliterated; ♀ subgenital plate short, with median furrow, lobes reduced, truncate; ovipositor sickle-shaped, broad and regularly curved; ♀ VII<sup>th</sup> sternite with two tubercles near the hind margin; hind femora very short; ♂ cerci thick with subapical tooth. Colour of lateral lobes of the pronotum is black bordered with a wide white stripe.

**Remarks.** Generally authors consider it a subgenus of *Platycleis*. The shortness of hind femora and the pronotum shape seem useful characters to separate definitively it from *Platycleis*.

**Distribution.** Central Asia.

**Number of species known** (after Eades *et al.* 2010): 6: 1) *beybienkoi* (Bezukin, 1978); 2) *crassa* Mishchenko, 1949; 3) *mistshenkoi* (Bekuzin, 1961); 4) *monochroma* Bei-Bienko, 1947; 5) *obuchovae* Mishchenko, 1949; 6) *pavlovskyi* Miram, 1935 (type species).

#### 25) *Chizuella* Furukawa, 1950 (Figs. 23, 104, 126)

**Characters.** Micropterous, pronotum not evidently excised, flat, median keel present; ♀ subgenital plate evidently excised, with two pointed lobes and a central deep furrow; ovipositor black, stout, short and regularly curved upwards; ♂ X<sup>th</sup> tergite with two short and very close processes. Colour of lateral lobes of the pronotum is greyish-black bordered with a white stripe.

**Remarks.** The only species included in this taxon (*C. bonneti*) was listed by Zeuner (1941) within *Metrioptera*.

**Distribution.** Japan.

**Number of species known** (after Eades *et al.* 2010): 1) *bonneti* (Bolivar, 1890) (type species).

#### 26) *Hypsopedes* Bei-Bienko, 1951

**Characters.** Micropterous, pronotum not excised, flat, and rounded, median keel present; ♀ subgenital plate evidently incised, as broad as long, side sclerites large, fused with the subgenital plate; ovipositor straight and gently upcurved in the apical third; hind femora/pronotum length ♂: 2.8; ♂ X<sup>th</sup> tergite with two very large and very close processes, cerci much flattened and provided with an inner central spine. The hind margin of male 1–3 tergites is lamellate. Titillators thorny in apical arms. Colour of lateral lobes of the pronotum is black bordered with a white stripe.

**Distribution.** Russia.

**Remarks.** We were not able to examine specimens of this rare montane endemic taxon, but Figs. 421–427 of Storozhenko (2004) consent us to consider *Hypsopedes* a well characterized genus, well distinct from others here

treated; additionally, Storozhenko (2004) separates it from other Platycleidini because hind margin of male 1–3 tergites is lamellate, while in other relatives it is smooth, and by its fastigium of vertex 1.4–1.9 times broader than 1<sup>st</sup> antennal segment, while in others taxa it is 2.4.

**Number of species known** (after Eades *et al.* 2010): 1) *kurentzovi* Bei-Bienko, 1951 (type species).

## 27) *Rammeola* Uvarov, 1934

**Characters.** Micropterous, face broad, vertex broad, pronotum rounded, short, not excised, median keel weakly developed in metazona or absent. ♀ subgenital plate with a wide-deep emargination and lateral keels; ovipositor ensiform, bent under an obtuse angle near the base, then feebly upcurved, bearing small tubercles on ventral margin near the apex; hind femora/pronotum length ♂: 2.5–2.9, ♀: 2.6–2.7; ♂ X<sup>th</sup> tergite emarginate with long and down-curved processes, cerci spinous, with a thick and curved tooth in the middle of apical half, base of tooth markedly widened. Titillators very small with circle-shaped basal arms. Colour of lateral lobes of the pronotum is black bordered with a wide white stripe.

**Distribution.** Turkey.

**Note.** This genus was named after the German orthopterist Willy Ramme.

**Remarks.** According to Çiplak (1999) it is closely related to *Zeuneriana* and *Afghanoptera*, but has a rather cylindrical pronotum, hind plantulae longer than half metatarsi, a wide-deep emargination and lateral keels on the ♀ subgenital plate, circle-shaped basal arms of titillators and emarginate X<sup>th</sup> tergite. Conversely, Ünal (2006) considers it related to *Sporadiana*, for the structure of tegmina, the shape of ovipositor, male X<sup>th</sup> tergite and cerci, female VII<sup>th</sup> sternite and subgenital plate.

**Number of species known** (after Eades *et al.* 2010): 1) *anatolica* Uvarov, 1934.

## 28) *Hermoniana* Broza, Ayal et Pener, 2004

**Characters.** Pronotum rounded, just excised, no longitudinal keels and no anterior sulcus; short hind leg and inflated (broad) femur; ♀ subgenital plate concave, bordered laterally and apically by wide lyre-shaped ridge; ovipositor gently upcurved, its tip with three unequal rows of very delicate denticles; ♂ X<sup>th</sup> tergite; median projection of titillators covered by denticles on outer and upper side; basal and apical arms at right angle to median projection; apical arm beak-like, long and fully sclerotized. Colour of lateral lobes of the pronotum is greyish bordered with a white stripe.

**Distribution.** Middle East.

**Remarks.** According to Broza *et al.* (2004) it is related to *Eumetrioptera*, mainly in the shape of pronotum, in the shortness of hind femora and in the ♂ cerci. Differences are more distinct in the titillators and in female tegmina.

**Number of species known** (after Eades *et al.* 2010): 2: 1) *blondheimae* Broza, Ayal et Pener, 2004; 2) *brozai* Ünal, 2006.

## 29) *Raggeana* Pener, Broza et Ayal, 1971

**Characters.** Macropterous, pronotum rounded, keeled on metazona, humeral excision slight; median keel distinct in metazona; hind legs very long; ♀ VI–VII<sup>th</sup> sternites markedly sculptured; ♀ subgenital plate large, with large lateral lobes, median keel at each side, two small protuberances at the hind part of the median area with a short furrow between them; ovipositor extremely long (ca. four times longer than pronotum), thin and flat, curved at base and almost straight apically; hind femora/pronotum length ♂: 3.9–4.0, ♀: 4.2–4.3; ♂ X<sup>th</sup> tergite with two elongated, incurved, triangular and sharply pointed processes, cerci extremely long, round and apically incurved and upcurved, reaching beyond subgenital plate, the distal part of cercus is flat and toothed. Titillators are very long and thin. Colour of lateral lobes of the pronotum is greyish with a light stripe.

**Distribution.** Palestine.

**Note.** This genus was named after the English orthopterist David R. Ragge.

**Remarks.** The sole species known of this genus, the Palestinian *R. bodenheimeri* (Uvarov, 1927), was transferred first by Zeuner (1941) from *Metrioptera* to *Sepiana*, after to *Platycleis* by Ramme (1951) and finally to *Raggeana* by Pener *et al.* (1971); it has a *Sepiana*-like pronotum, but male processes and cerci, and female subgenital plate and ovipositor are very unique. According to Pener *et al.* (1971), characteristics of this taxon consent to differentiate it from any other within the tribe Platycleidini.

**Number of species known** (after Eades *et al.* 2010): 1) *bodenheimeri* (Uvarov, 1927).

### 30) *Uludaghia* Ramme, 1951 (Figs. 17, 74, 101, 124)

**Characters.** Head just larger than long, ratio maximum width/length of head (from vertex to clipeus): 1.1–1.2. Micropterous, pronotum rounded, depressed and keeled, not excised; ovipositor long, gently upcurved; ♀ subgenital plate with an evident hind incision forming two triangular lobes; hind femora/pronotum length ♂♀: 2.8–3.1; ♂ X<sup>th</sup> tergite with wide processes, semicircularly pointed, cerci flattened with a subapical pointed tooth. Colour of lateral lobes of the pronotum is blackish bordered with a white stripe.

**Distribution.** Turkey.

**Number of species known** (after Eades *et al.* 2010): 1) *gerdae* Ramme, 1951.

### 31) *Afghanoptera* Ramme, 1952

**Characters.** Micropterous, medium sized, fastigium wider than eye width. Pronotum rounded, keel just evident in the metazona, hind margin wide and convex. Tegmina longer than half pronotum, reaching the 2<sup>nd</sup> tergite; hind femora/pronotum length ♂♀: 2.5; ♂ X<sup>th</sup> tergite broken in the middle by a deep rectangular incision, cerci broadkin-shaped, just incurved, with a small inner teeth in the last fourth. The subgenital plate of the male is narrow and nearly reaches cerci apex. The basal and apical arms of titillators are at right angle. The female is unknown.

**Distribution.** Afghanistan.

**Number of species known** (after Eades *et al.* 2010): 1) *adusta* Ramme, 1952 (type species).

### 32) *Ariagona* Krauss, 1892 (Figs. 9, 76, 84, 117)

**Characters.** Head nearly as large as long, ratio maximum width/length of head (from vertex to clipeus): 1.0–1.1. Micropterous, pronotum rounded, not excised, depressed, ca. 1.6–1.7 longer than high, keel not evident; ovipositor regularly upcurved; ♀ subgenital plate evidently excised, with two pointed lobes; ovipositor yellowish, regularly upcurved; hind femora/pronotum length ♂♀: 3.4–4.0; ♂ X<sup>th</sup> tergite with two pointed and very close processes, cerci long, rounded, with an inner subapical tooth. Colour of lateral lobes of the pronotum is black bordered with a wide white stripe.

**Remarks.** Relationships with other genera of Platycleidini are not clear.

**Distribution.** Endemic to Canary Is.

**Number of species known** (after Eades *et al.* 2010): 1) *margaritae* Krauss, 1892 (type species).

## Biogeographic considerations

On the whole, the group of Platycleidini here considered amounts to 168 species, shared within 32 supraspecific taxa, that we consider valid genera (cf. Table 3).

TABLE 3. Taxa (alphabetically arranged) here considered and their main taxonomical characters.

Taxa	Pronotum			Ovipositor		♀ subgenital plate	♂ X <sup>th</sup> tergite
	Disc shape	Median keel in metazona	Lateral lobes	Base	Curvature		
<i>Afghanoptera</i>	Borders rounded	Obliterated	Just excised	?	?	?	Broken in the middle by a deep rectangular incision, cerci brodkin-shaped
<i>Alticolana</i>	Borders rounded	Present	Not excised	Compressed	Regularly curved	Raised in the middle near the base, with a shallow furrow	Short
<i>Amedegnatiana</i>	Flat, borders rounded	Present	Just excised	Large and stout	Gently curved	Just incised hind margin	Long, pointed
<i>Ariagona</i>	Borders rounded	Obliterated	Not excised	Compressed	Regularly upcurved	With an evident hind incision forming two triangular lobes	With two pointed curved processes
<i>Bicolorana</i>	Flat	Present	Excised	Compressed	Rapidly tapering and sharply bent upwards	Widened, flat, deeply incised, separated from ovipositor	Short
<i>Broughtonia</i>	Flat	Present	Excised	Compressed	Regularly curved	With a deep triangular incision of the apex	Short
<i>Chizuella</i>	Borders rounded	Present	Not excised	Compressed	Stout, short and regularly curved	Excised, with two pointed lobes and a central deep furrow	Short and very close processes
<i>Decorana</i>	Borders and disc rounded, disc just flat, metazona short	More or less obliterated	Just excised	Compressed	Suddenly recurved at base, thence nearly straight	Flat, incised apically, rounded or apically straight, longitudinally grooved	Short or long
<i>Eobiana</i>	Borders rounded	Present	Just excised	Compressed	Stout, short and regularly curved	Long, with a basal keel, side sclerites large, fused with the subgenital plate, apical lobes pointed and deeply incised	Short, with pointed processes
<i>Eumetrioptera</i>	Borders rounded	Obliterated	Not excised	Compressed, sickle-shaped, broad	Regularly curved	Short, with median furrow, lobes reduced, truncate	Short
<i>Hermoniana</i>	Borders rounded	Absent	Not excised	Compressed	Gently upcurved	Concave, bordered laterally and apically by wide lyre-shaped ridge	With hairy space between broad lobes

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TABLE 3 (continued)

Taxa	Pronotum			Ovipositor		♀ subgenital plate	♂ X <sup>th</sup> tergite
	Disc shape	Median keel in metazona	Lateral lobes	Base	Curvature		
<i>Hypsopedes</i>	Borders rounded	Present	Not excised	Compressed	Straight and gently upcurved in the apical third	Incised, as broad as long, side sclerites large, fused with the subgenital plate	With two very large and very close processes
<i>Metrioptera</i>	Flat	Present	Just excised	Compressed	Slender, regularly curved	Rounded or keeled, just incised	Short, with pointed processes
<i>Modestana</i>	Borders rounded	Obliterated	Not excised	Compressed	Gently curved	Smooth with an excision of the hind margin	Short
<i>Montana</i>	Depressed	Present	Just excised	Large	Regularly curved	Depressed, apically v-shaped or straight	Short
<i>Parnassiana</i>	Borders rounded	Present	Just excised	Large and long	Fairly straight	With smooth rounded lobes	Long, modified
<i>Platycleis</i>	Depressed	Present	Evidently excised	Compressed	Regularly curved mostly blackish	Parallel, medially grooved, raised keels, incised apically	Short
<i>Pravdiniana</i>	Depressed	Present	Not excised	Compressed	Curved at base at obtuse angle	Elongated, with two lobes separated by a wide furrow	Unknown
<i>Raggeana</i>	Borders rounded	Present	Slight excised	Thin and flat	Curved at base, almost straight apically	Large, with large lateral lobes	With two pointed and inward curved processes
<i>Rammeola</i>	Borders rounded	Weakly developed in metazona or absent	Not excised	Compressed	Bent under an obtuse angle near the base, then feebly upcurved	With a wide-deep emargination and lateral keels	Emarginate with long and downcurved processes
<i>Roeseliana</i>	Flat, metazona short	Present	Excised	Compressed	Rapidly tapering and sharply bent upwards	Widened, flat, deeply incised, separated from ovipositor	Broad, adjacent or pointed and separated by an incision
<i>Sardoplatycleis</i>	Depressed	Present	Excised	Compressed	Regularly curved basal half whitish	Parallel, not medially grooved, raised keels, incised apically	Short
<i>Semenoviana</i>	Depressed	Present	Excised	Large	Fairly straight and tapering rapidly	With a furrow or a keel	Short
<i>Sepiana</i>	Borders and disc rounded, metazona short	Obliterated	Not excised	Compressed	Regularly curved	Very short, with a wide rectangular incision	Very short

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TABLE 3 (continued)

Taxa	Pronotum			Ovipositor		♀ subgenital plate	♂ X <sup>th</sup> tergite
	Disc shape	Median keel in metazona	Lateral lobes	Base	Curvature		
<i>Sphagniana</i>	Borders rounded	Obliterated	Not excised	Compressed	Regularly curved, right from the base	Very small, wider than long	Broad
<i>Sporadiana</i>	Borders rounded	Obliterated	Not excised	Compressed	Sharply recurved at the base, thence tapering rapidly	Wide, longitudinally keeled, apically incised	Broad
<i>Squamiana</i>	Borders rounded	Present	Just excised	Compressed	Regularly curved	Depressed, longitudinally keeled, apically just incised	Short or long, pointed processes, more or less close
<i>Tessellana</i>	Depressed	Present	Excised	Compressed	Rapidly tapering and sharply bent upwards	Parallel raised keels, incised apically	Short
<i>Uludaghia</i>	Borders rounded	Present	Not excised	Compressed	Straight and feebly upcurved in the last portion	With an evident hind incision forming two triangular lobes	With wide processes, semicircularly pointed
<i>Vichezia</i>	Flat	Present	Just excised	Compressed	Curved upwards in the basal third	With a basal keel, side sclerites large, fused with the subgenital plate	Short, with pointed processes
<i>Yalvaciana</i>	Borders rounded	Present	Not excised	Compressed	Regularly curved	Bilobate, wide-deeply incised	Short
<i>Zeuneriana</i>	Flat, metazona long	Present	Excised	Compressed	Rapidly tapering and sharply bent upwards	With hind margin broadly and deeply emarginate, terminal lobes long	Short

Generally, the centre of speciation or area of origin of a genus matches the area occupied by the highest number of species. Platycleidini (sensu Zeuner, 1941) include groups that we can define tentatively as palaearctic (*Platycleis*, *Roeseliana*, *Montana* and *Metrioptera*), eastern (*Alticolana*, *Bicolorana*, *Semenoviana*, *Parnassiana*, *Sporadiana*, *Eumetrioptera*, *Squamiana* and *Modestana*), South European (*Zeuneriana*) and mediterranean (*Sepiana*, *Decorana* and *Tessellana*).

It seems that groups covering the widest areas (*Platycleis*, *Tessellana*, *Montana*) show a depressed and excised pronotum. Among those with rounded borders and barely excised pronotum, only *Metrioptera* and *Roeseliana* cover a wide distribution both in Asia and Europe. We can assume that two evolutive lines originated from relative ancestors, namely *Platycleis*-type and *Metrioptera*-type. A possible third group, *Sphagniana*, intermediate between them, may have evolved in eastern Asia and from there could have colonised the American continent. The ovipositor of *Decticus*-type may have appeared independently in the two evolutive lines. Within two main groups eventually other “endemic” subgroups may have differentiated, covering limited areas (*Sardoplatycleis*, *Amedegniana*, *Parnassiana*, *Modestana*, *Sporadiana*, *Yalvaciana*, *Pravdiviana*, *Eobiana*, *Eumetrioptera*, *Chizuella*, *Hypsopedes*, *Rammeola*, *Hermoniana*, *Raggeana*, *Ariagona*, *Afghanoptera* and *Uludaghia*); some of them are characterized by a

pronotal disc with rounded borders and lateral lobes not excised. The “endemic” subgroup *Decorana/Incertana* probably has Middle eastern origins and from there spread towards West and South-West, colonizing Balkan peninsula, North Africa, Arabian peninsula and subsequently the Iberian peninsula and Sicily.

Concerning *Metrioptera*, possibly it colonized Europe from N Asia, then produced different isolated groups of species, mainly linked to mountains. Conversely, *Platycleis* shows a very wide distribution covered by many species, probably of asiatic origin, some of which may have colonised Europe from the North, others through the Mediterranean. Isolation may have produced some endemic taxa on islands and mountains. Fossil specimens of large size of *Platycleis sensu stricto* from the lower Miocene have been found in Europe (Zeuner 1939), suggesting an ancient presence of this genus, dating back to 7 million years. Some steppic groups and others, mesophilous and typical of a cool climate, as *Montana*, *Modestana*, *Roeseliana* and others may have colonised Europe from Asia and Siberia but also from the Mediterranean.

## Conclusions

According to Heller & Korsunovskaya (2009) the definition of a group by a list based on the general similarities of the species is certainly not scientifically satisfying nor even a satisfactory solution, but it seems better than any other available at the moment. We are convinced that in the classification of Platycleidini orthopterists have overused subgenera, probably for convenience, but as we have tried to show in the previous pages each taxon here considered (with only few exceptions) may be easily separated by the others, and both males and females may be assigned with the same certainty to each of them. For these reasons we propose to come back to the use of genera within the tribe Platycleidini; in the future, to understand their probable phylogeny a more extensive revision shall be needed, possibly including all the taxa belonging to this tribe. Concluding, we propose a key to genera here treated by us.

## Key to genera (to be used with Table 3 and Figs. 1–140)

1	Humeral excision on the lateral lobes of the pronotum evident, disc shape of pronotum depressed, with evident borders (Figs. 1, 2, 3, 4, 5) . . . . .	2
-	Humeral excision on the lateral lobes of the pronotum less evident, lobes sinuous or obliquely shaped, disc shape of pronotum flat, with rounded borders (Figs. 6, 7, 8, 9, 10, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 27, 28, 29, 30, 31, 32) . . . . .	6
2	Humeral excision at $\frac{3}{4}$ of the pronotum length, median keel raised in the metazona (Figs. 1, 3), ♂ X <sup>th</sup> tergite with two short processes, ovipositor compressed, regularly curved (Fig. 106) . . . . .	3
-	Humeral excision at 4/5 of the pronotum length (Figs. 2, 3, 5) . . . . .	4
3	Larger size. Humeral excision more evident (Fig. 1), ovipositor black with whitish base (Fig. 48), ♀ subgenital plate incised apically with parallel raised keels and a central groove (Fig. 78) . . . . .	<i>Platycleis</i>
-	Smaller size. Humeral excision more obtuse (Fig. 4), basal half of ovipositor whitish (Fig. 49), ♀ subgenital plate medially raised, not grooved (Fig. 79) . . . . .	<i>Sardoplatycleis</i>
4	♂ X <sup>th</sup> tergite with two short narrow processes (Fig. 107), not pointed, ovipositor compressed, very short, black with whitish base, rapidly tapering and sharply bent upwards (Fig. 64), ♀ VII <sup>th</sup> sternite evidently modified, ♀ subgenital plate incised apically with two parallel raised keels (Fig. 80) . . . . .	<i>Tessellana</i>
-	♂ X <sup>th</sup> tergite with two wide pointed processes (Fig. 108), ovipositor large at the base, not laterally compressed, whitish (Figs. 72, 73) . . . . .	5
5	♂ X <sup>th</sup> tergite with short processes, ovipositor fairly straight and tapering rapidly . . . . .	<i>Semenoviana</i>
-	♂ X <sup>th</sup> tergite with processes of variable length (Fig. 108), ovipositor regularly curved (Figs. 72, 73), ♀ subgenital plate depressed, apically v-shaped or straight (Figs. 82, 83) . . . . .	<i>Montana</i>
6	Ratio hind femora/pronotum length $\leq 2.6$ . . . . .	7
-	Ratio hind femora/pronotum length $> 2.6$ . . . . .	9
7	♂ X <sup>th</sup> tergite broken in the middle by a deep rectangular incision, cerci broadkin-shaped . . . . .	<i>Afghanoptera</i> (only ♂ known)
-	X <sup>th</sup> tergite triangularly pointed or large and long . . . . .	8
8	Ratio hind femora/pronotum length $\leq 2.4$ . Ratio pronotum length/height = 1.4–1.5, processes of ♂ X <sup>th</sup> tergite triangularly pointed (Fig. 120), ovipositor stout (Fig. 58), ca. 1.3–1.4 as long as pronotum . . . . .	<i>Amedegnatiana</i>
-	Ratio hind femora/pronotum length $\leq 2.6$ . Ratio pronotum length/height = 1.2–1.3, processes of ♂ X <sup>th</sup> tergite large and long (Fig. 119), ovipositor slender (Fig. 60), ca. 2–2.2 as long as pronotum . . . . .	<i>Parnassiana</i>
9	Ratio hind femora/pronotum length between 2.6 and 3.0 . . . . .	10
-	Ratio hind femora/pronotum length $> 3.0$ . . . . .	15

10	♂ X <sup>th</sup> tergite with short processes (Figs. 112, 114, 116, 110), ♀ subgenital plate more or less bilobate (Figs. 87, 89, 90, 93)...	11
-	♂ X <sup>th</sup> tergite with pointed processes, cerci cylindrical (Figs. 113, 115), ♀ subgenital plate incised (Figs. 86, 88, 92) .....	12
11	Male cerci flattened (Figs. 112, 116), ♀ subgenital plate rounded or keeled (Figs. 87, 89), ovipositor regularly curved (Fig. 51). ....	13
-	Male cerci cylindrical (Figs. 110, 114), ♀ subgenital plate widened, incised (Figs. 90, 93), ovipositor rapidly tapering and sharply bent upwards (Fig. 53) .....	14
12	♂ X <sup>th</sup> tergite with pointed processes (Fig. 115), ♀ subgenital plate as broad as long or broader than long, with a basal keel, side sclerites large, fused with the subgenital plate (Fig. 92).....	<i>Vichezia</i>
-	♂ X <sup>th</sup> tergite with broad and long processes, adjacent or separated by an incision (Fig. 113), ♀ subgenital plate large, bilobate, at the sides not touching the ovipositor (Figs. 86, 88) .....	<i>Roeseliana</i>
13	♂ X <sup>th</sup> tergite with two pointed processes (Fig. 112), ♀ subgenital plate without median furrow (Fig. 87) .....	<i>Metrioptera</i>
-	♂ X <sup>th</sup> tergite semicircularly emarginate, spine-shaped, cerci flattened in the apical third (Fig. 116), ♀ subgenital plate with a deep triangular incision of the apex (Fig. 89) .....	<i>Broughtonia</i>
14	♂ X <sup>th</sup> tergite with two apical pointed processes, cerci long, only apically flattened (Fig. 114), ♀ subgenital plate longer than wide, incised, at the sides not touching the ovipositor (Fig. 93).....	<i>Bicolorana</i>
-	♂ X <sup>th</sup> tergite broad, with two short triangular processes, cerci short, stout and toothed at the base or proximally (Fig. 110), ♀ subgenital plate with hind margins broadly and deeply emarginate, long terminal lobes (Fig. 90).....	<i>Zeuneriana</i>
15	Pronotum depressed, keel on metazona evident (Figs. 20, 26), ♀ subgenital plate elongated, with two long lobes (Figs. 81, 91). ....	31
-	Borders of pronotum rounded (Figs. 17, 18, 19, 21, 22, 23, 24, 25, 33–42).....	16
16	Keel on metazona evident (Figs. 18, 19, 23).....	17
-	Keel on metazona more or less obliterated (Figs. 17, 21, 22, 24, 25, 33–42).....	19
17	♂ X <sup>th</sup> tergite with short and very close processes (Fig. 126), ♀ subgenital plate excised with two pointed lobes and a central furrow (Fig. 104).....	<i>Chizuella</i>
-	♂ X <sup>th</sup> tergite with short or long processes, more or less close (Figs. 121–123), ♀ subgenital plate incised, but without pointed lobes (Figs. 99, 100) .....	18
18	Male cerci with a spine in distal half and another at apex, ♀ subgenital plate wide-deeply incised .....	<i>Valvaciana</i>
-	♂ X <sup>th</sup> tergite with two more or less pointed short processes (Figs. 121–123), ♀ subgenital plate depressed, longitudinally keeled, apically just incised (Figs. 99, 100) .....	<i>Squamiana</i>
19	Ratio hind femora/pronotum length $\leq 3.0$ .....	20
-	Ratio hind femora/pronotum length $> 3.0^3$ .....	22
20	♂ X <sup>th</sup> tergite with broad processes (Figs. 117, 118, 119, 120, 124, 125, 127–132), ovipositor compressed (Figs. 50, 56–60, 65–69, 71, 74–76) .....	21
-	♂ X <sup>th</sup> tergite with short processes, ovipositor sickle shaped or compressed (Fig. 62) .....	26
21	♂ X <sup>th</sup> tergite enlarged, incised in the middle, with two expanded processes (Fig. 111), ♀ subgenital plate wider than long or as long as wide with large lateral sclerites (Fig. 98) .....	25
-	♂ X <sup>th</sup> tergite with broad processes (Fig. 124), ♀ subgenital plate with an evident hind incision (Fig. 101) .....	27
22	Pronotum with lobes quite triangular (Fig. 21).....	28
-	Pronotum with lobes more rounded (Figs. 6, 7, 9, 33–42) ♂ X <sup>th</sup> tergite with more or less long processes, cerci rounded (Figs. 109, 117, 125, 127–132), ♀ subgenital plate as long as wide or just longer than wide (Figs. 84, 97, 102, 103, 105) .....	23
23	Processes of the ♂ X <sup>th</sup> tergite pointed (Figs. 109, 117), ovipositor regularly or gently curved (Figs. 56, 76) .....	24
-	Processes of the ♂ X <sup>th</sup> tergite longer (Figs. 125, 127–132), ovipositor long and narrow suddenly recurved at the base, thence nearly straight, or short and high at the base (Figs. 65–71), ♀ subgenital plate flat, incised apically, longitudinally grooved, rounded, apically straight (Figs. 102, 103, 105).....	<i>Decorana (including Incertana)</i>
24	♂ X <sup>th</sup> tergite with two pointed processes (Figs. 109, 117); ♀ subgenital plate smooth, with an evident excision on the hind margin (Figs. 84, 97); ovipositor gently curved upwards (Figs. 56, 76) .....	29
-	♂ X <sup>th</sup> tergite with short processes; ♀ subgenital plate small, raised in the middle near the base, with a shallow comma-shaped furrow, ovipositor regularly curved (Fig. 59) .....	<i>Alticolana</i>
25	♂ X <sup>th</sup> tergite with two expanded processes covering cerci (Fig. 111), ♀ subgenital plate very small, wider than long (Fig. 98), ovipositor slender, long and regularly curved near the base (Fig. 57) .....	<i>Sphagniana</i>
-	♂ X <sup>th</sup> tergite with two very large and very close processes, cerci much flattened and provided with an inner central spine, ♀ subgenital plate evidently incised, as broad as long, side sclerites large, fused with the subgenital plate, ovipositor straight and gently curved upwards in the apical third .....	<i>Hypsopedes</i>
26	Pronotum almost laterally triangular (Fig. 24); ♂ cerci thick with subapical tooth; ovipositor sickle-shaped, broad, regularly curved (Fig. 62) .....	<i>Eumetrioptera</i>
-	Pronotum rounded, short, median keel weakly developed in metazona or absent, ovipositor ensiform, bent under an obtuse angle near the base, then feebly upcurved; ♂ X <sup>th</sup> tergite emarginate with long and downcurved processes, cerci spinous, with a thick and curved tooth in the middle of apical half .....	<i>Rammeola</i>
27	Pronotum rounded, depressed and keeled (Fig. 17); ovipositor long, straight and feebly upcurved in the last portion (Fig. 74); .....	

3. The ratio hind femora/pronotum length in *Uludaghia* resulted to be 2.8–3.1, but we placed it within the species with ratio  $\leq 3.0$ . However, identification of this genus is rather easy for its characteristics.

	♂ X <sup>th</sup> tergite with wide processes, semicircularly pointed, cerci flattened with a subapical pointed tooth (Fig. 124) . . . . .	Uludagchia
-	Pronotum rounded, without keels (Fig. 22) . . . . .	30
28	Brachypterous, ♂ X <sup>th</sup> tergite with short and wide processes, cerci flattened (Fig. 118), ♀ subgenital plate very short, with a wide hind rectangular incision (Fig. 94) . . . . .	Sepiana
-	Macropterous, ♂ X <sup>th</sup> tergite with two elongated, incurved, triangular and sharply pointed processes, cerci extremely long, round and apically incurved and upcurved; ♀ subgenital plate large, with large lateral lobes, ovipositor extremely long (ca. four times longer than pronotum), thin and flat, curved at base and almost straight apically . . . . .	Raggeana
29	Ratio pronotum length/height = 1 (Fig. 6); cerci of male apically flattened (Fig. 109); ♀ subgenital plate smooth, with an evident excision on the hind margin (Fig. 97); ovipositor whitish, long and gently curved upwards (Fig. 56) . . . . .	Modestana
-	Ratio pronotum length/height = 1.6-1.7 (Fig. 9); cerci of male rounded and long (Fig. 117), ♀ subgenital plate evidently excised, with two pointed lobes (Fig. 84); ovipositor yellowish, regularly upcurved (Fig. 76) . . . . .	Ariagona
30	♂ X <sup>th</sup> tergite with two wide processes; basal arms of titillators with spines; ovipositor curved at the base, thence straight, long and slender (Fig. 75); large and gibbous ♀ VI <sup>th</sup> sternite . . . . .	Sporadiana
-	♂ X <sup>th</sup> tergite with hairy space between broad lobes, cerci rounded with subapical tooth; median projection of titillators covered by denticles on outer and upper side, basal and apical arms at right angle to median projection, apical arm beak-like, long and fully sclerotized; ovipositor long, straight, tip with three unequal rows of very delicate denticles; ♀ subgenital plate concave, bordered laterally and apically by wide lyre-shaped ridge . . . . .	Hermoniana
31	♀ subgenital plate elongated, with two lobes separated by a wide furrow (Fig. 81); ovipositor short, its length is twice pronotum, curved at base at obtuse angle (Fig. 77) . . . . .	Pravdiniana (only ♀ known)
-	♀ subgenital plate long, with a basal keel, side sclerites large, fused with the subgenital plate, apical lobes pointed and deeply incised (Fig. 91); ovipositor stout, short and regularly curved, its length is 1.3-2.0 as long as pronotum (Fig. 55); ♂ X <sup>th</sup> tergite incised in the middle, with pointed processes, separated or semicircularly close . . . . .	Eobiana

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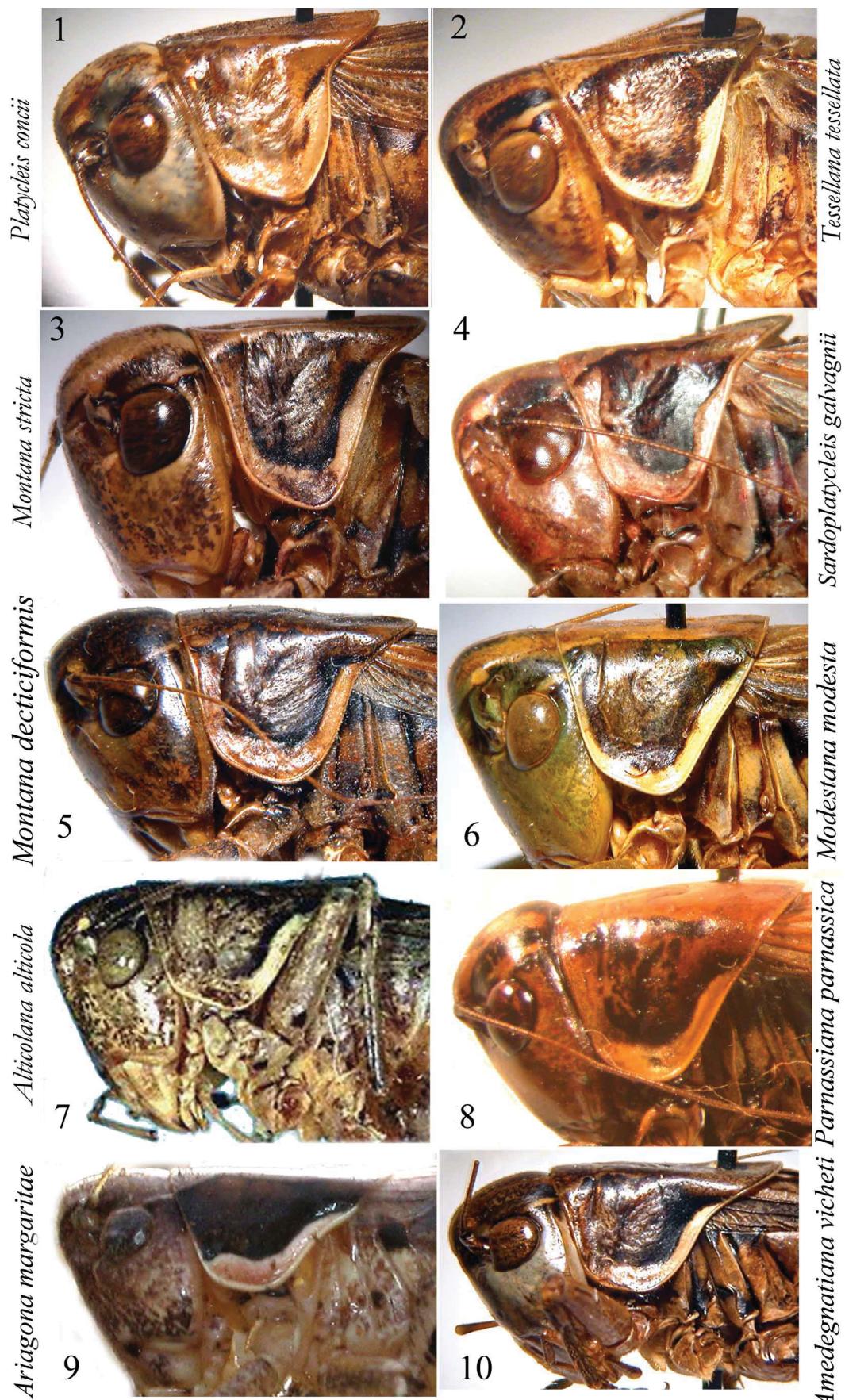
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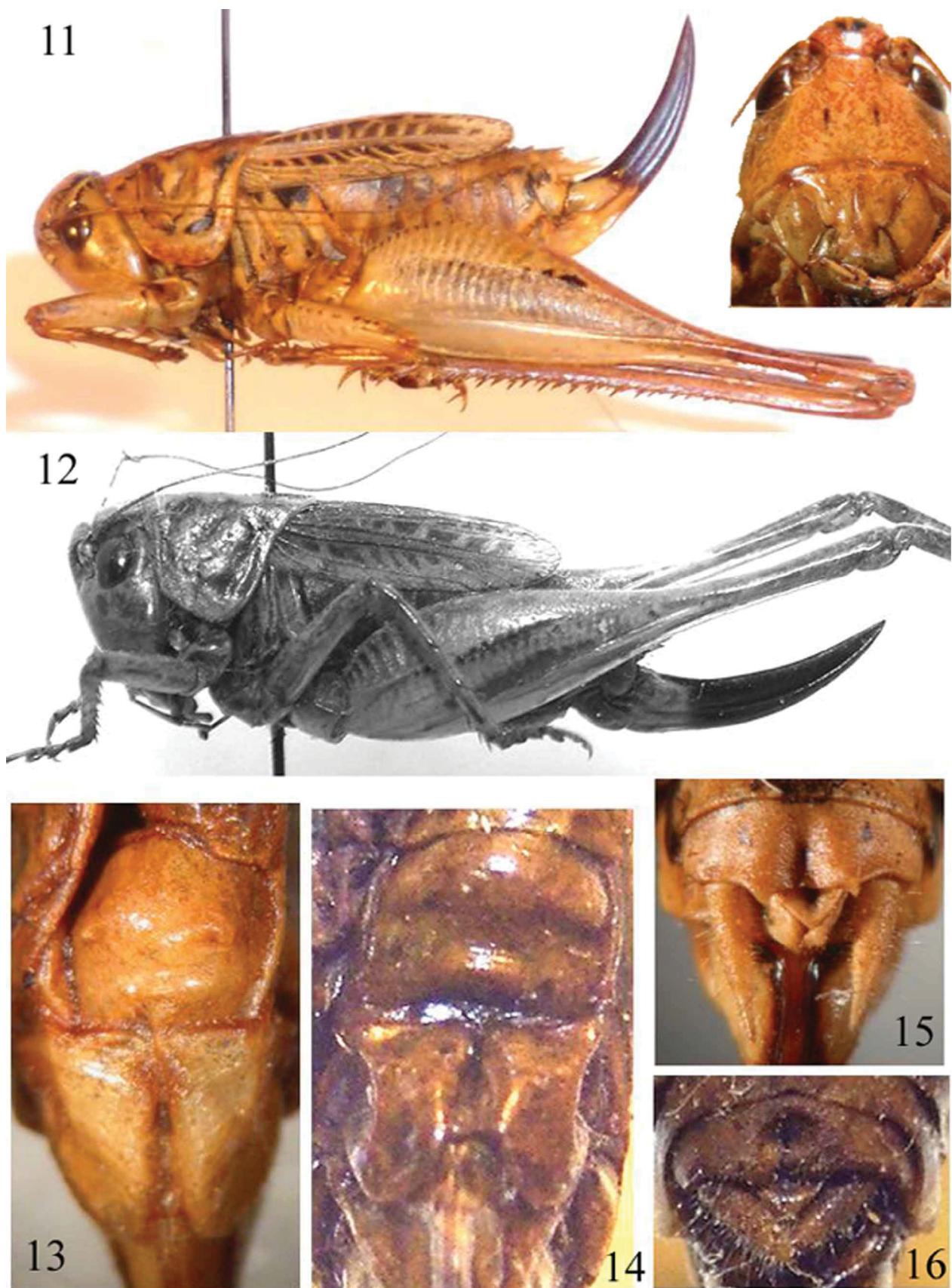
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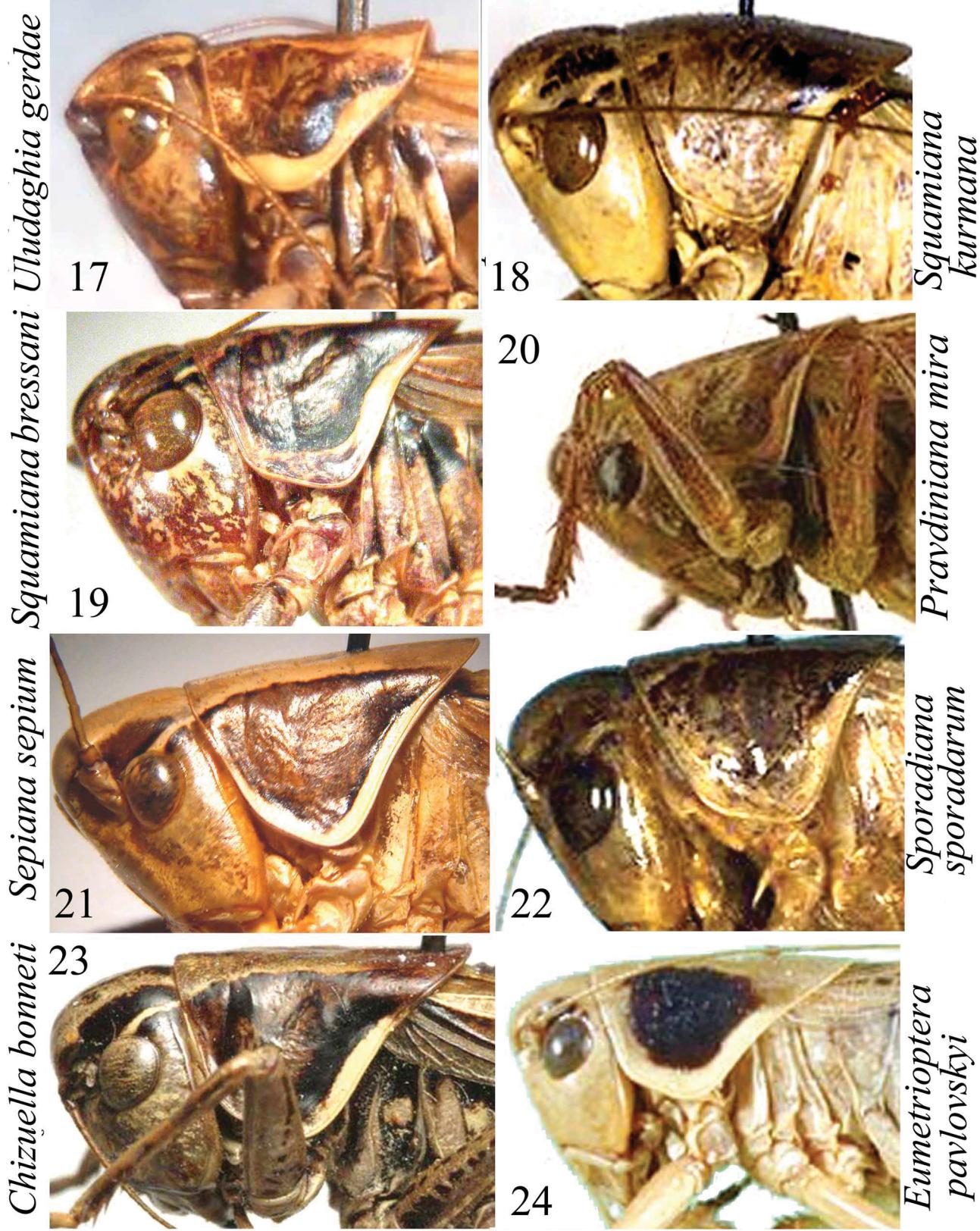
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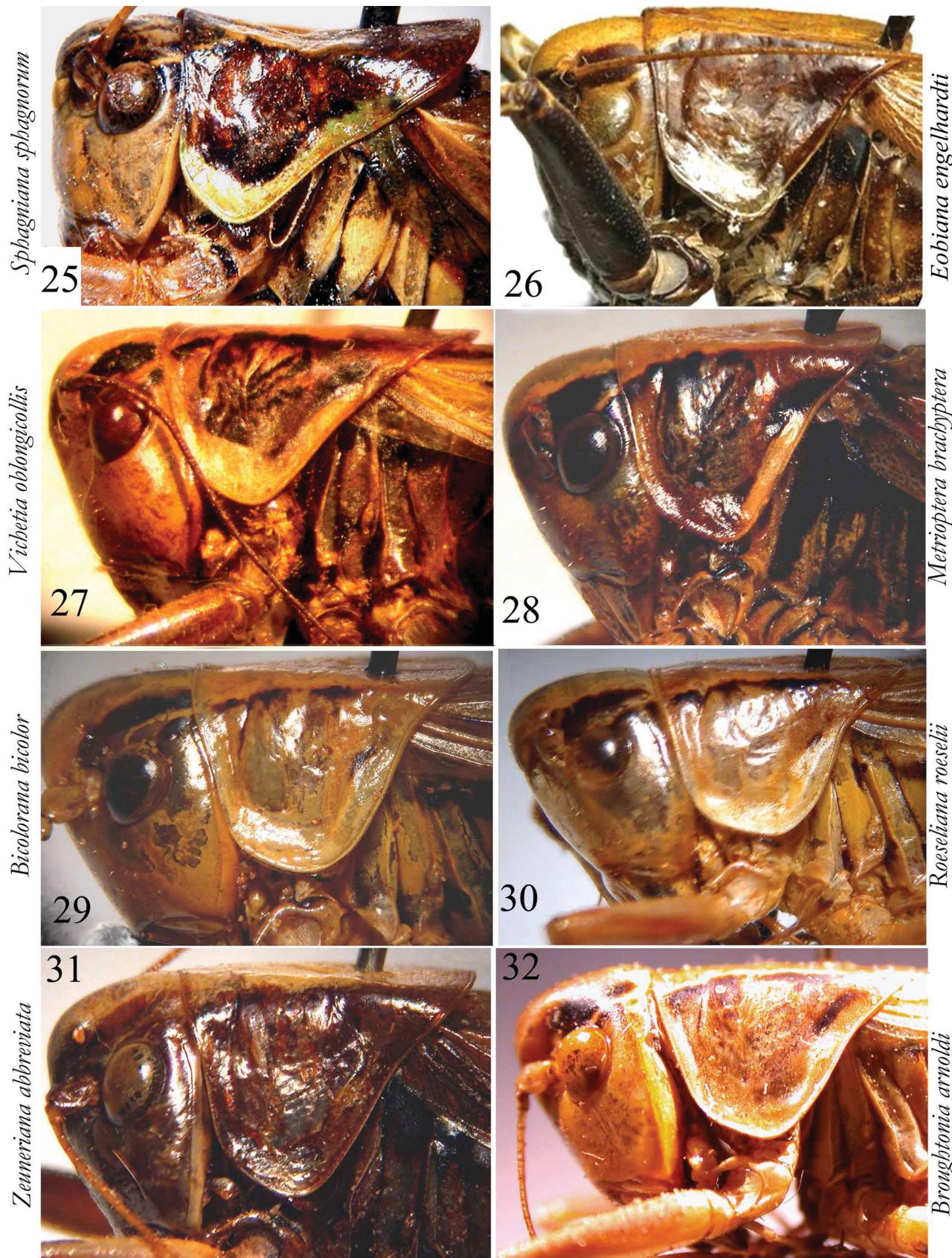
**FIGURES 1–10.** Lateral view of the pronotum of 10 species of Platycleidini (*Platycleis*, *Tessellana*, *Montana*, *Sardoplatycleis*, *Modestana*, *Alticolana*, *Parnassiana*, *Ariagona*, *Amedegnatiana*).



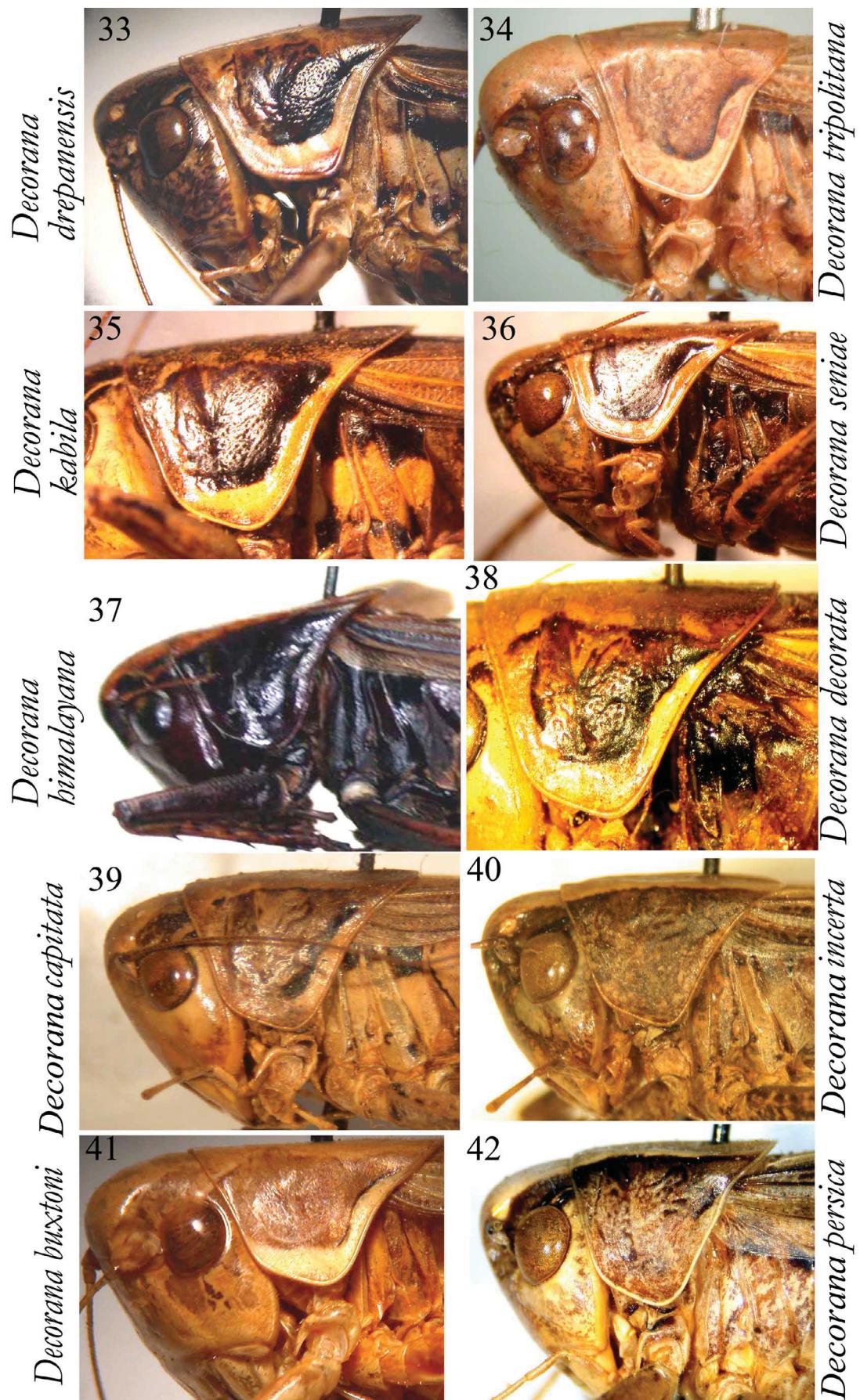
**FIGURES 11–16.** 11) Lateral view of the holotype of *Platycleis buzzettii* n. sp. (in the inset frontal view of the head); 12) Lateral view of one unidentified Iranian species of *Platycleis* related to the previous one (photo by G.A. Garai); 13) Subgenital plate of the holotype of *Platycleis buzzettii* n. sp.; 14) Subgenital plate of the specimen 12; 15) Last tergite of the holotype of *Platycleis buzzettii* n. sp.; 16) Last tergite of the specimen 12.



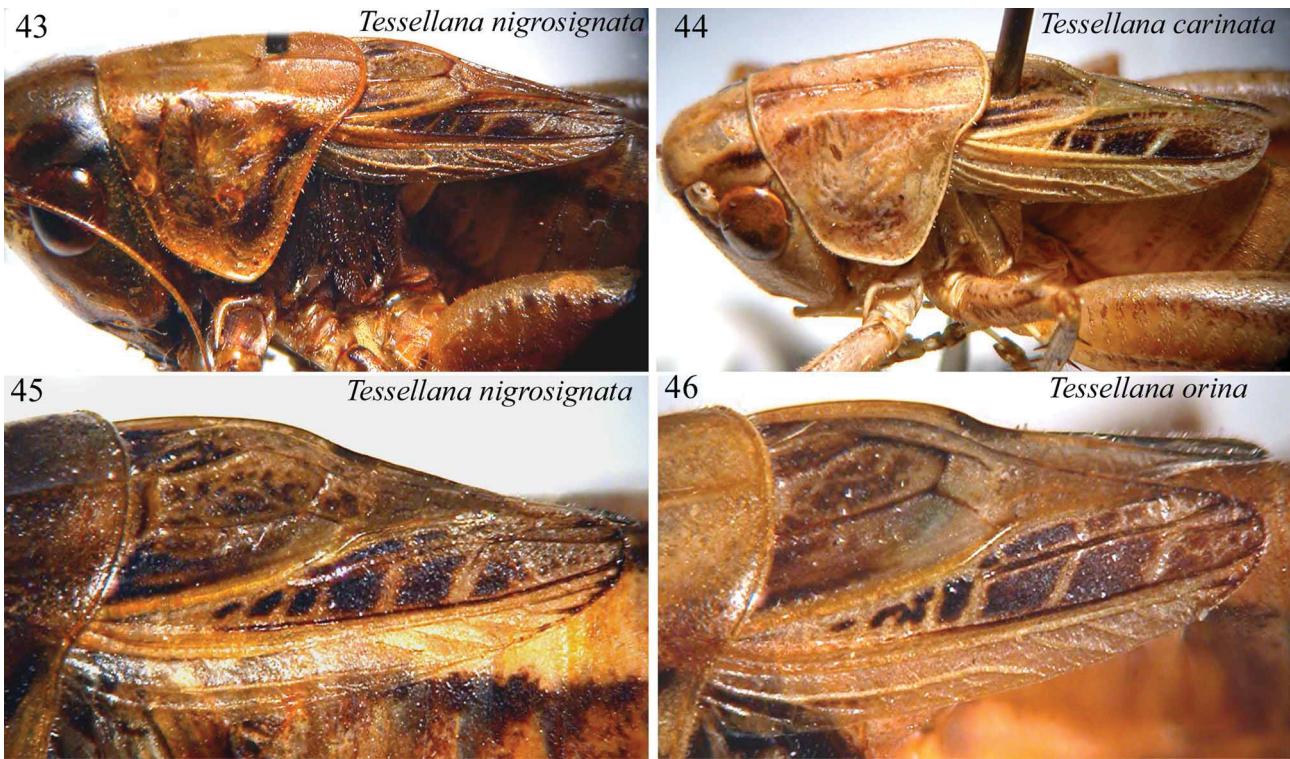
**FIGURES 17–24.** Lateral view of the pronotum of 8 species of Platycleidini (*Uludaghia*, *Squamiana*, *Pravdiniana*, *Sepiana*, *Sporadiana*, *Chizuella*, *Eumetrioptera*).



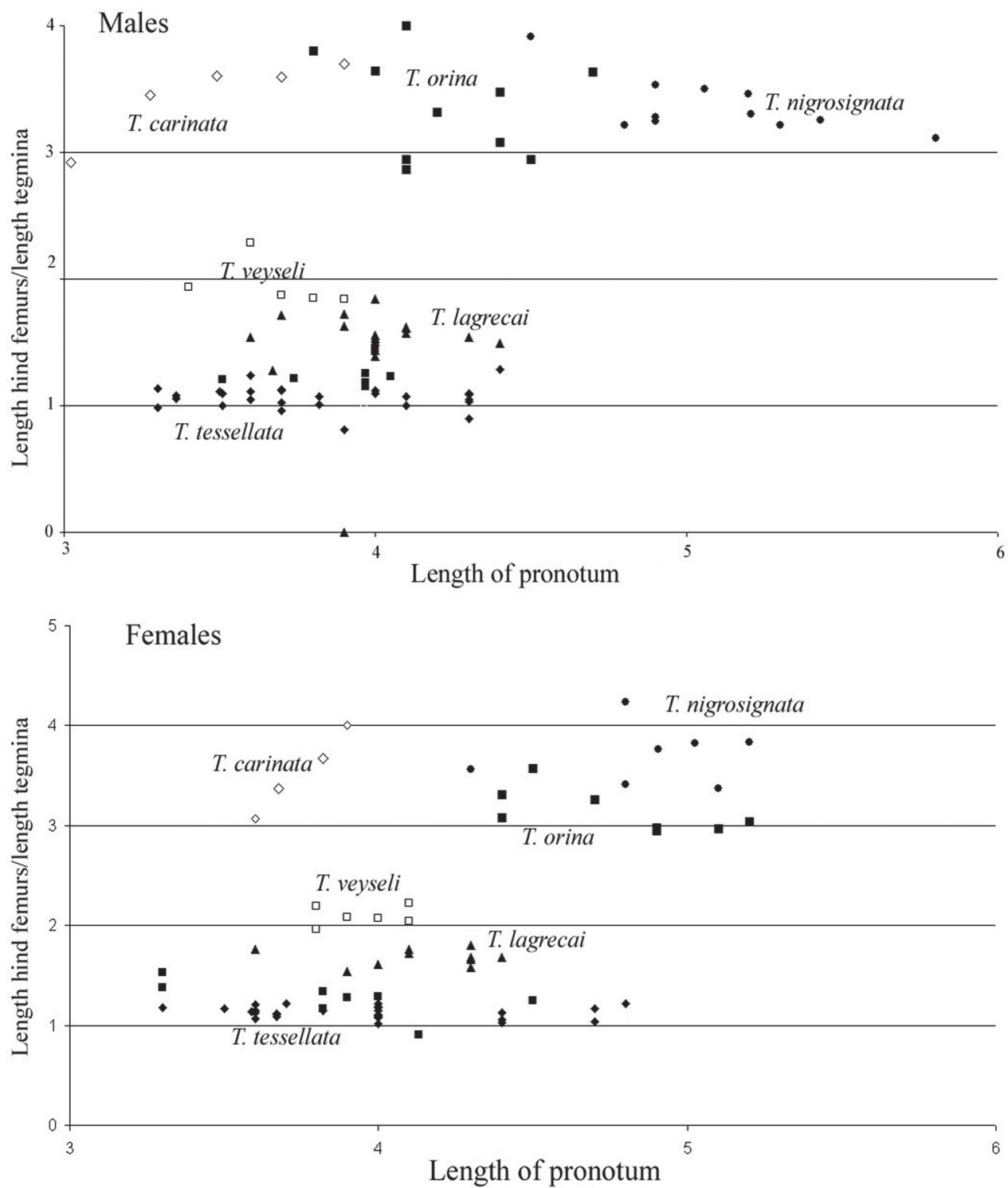
**FIGURES 25–32.** Lateral view of the pronotum of other 8 species of Platycleidini (*Sphagniana*, *Eobiana*, *Vichetia*, *Metrioptera*, *Bicolorana*, *Roeseliana*, *Zeuneriana*, *Broughtonia*).



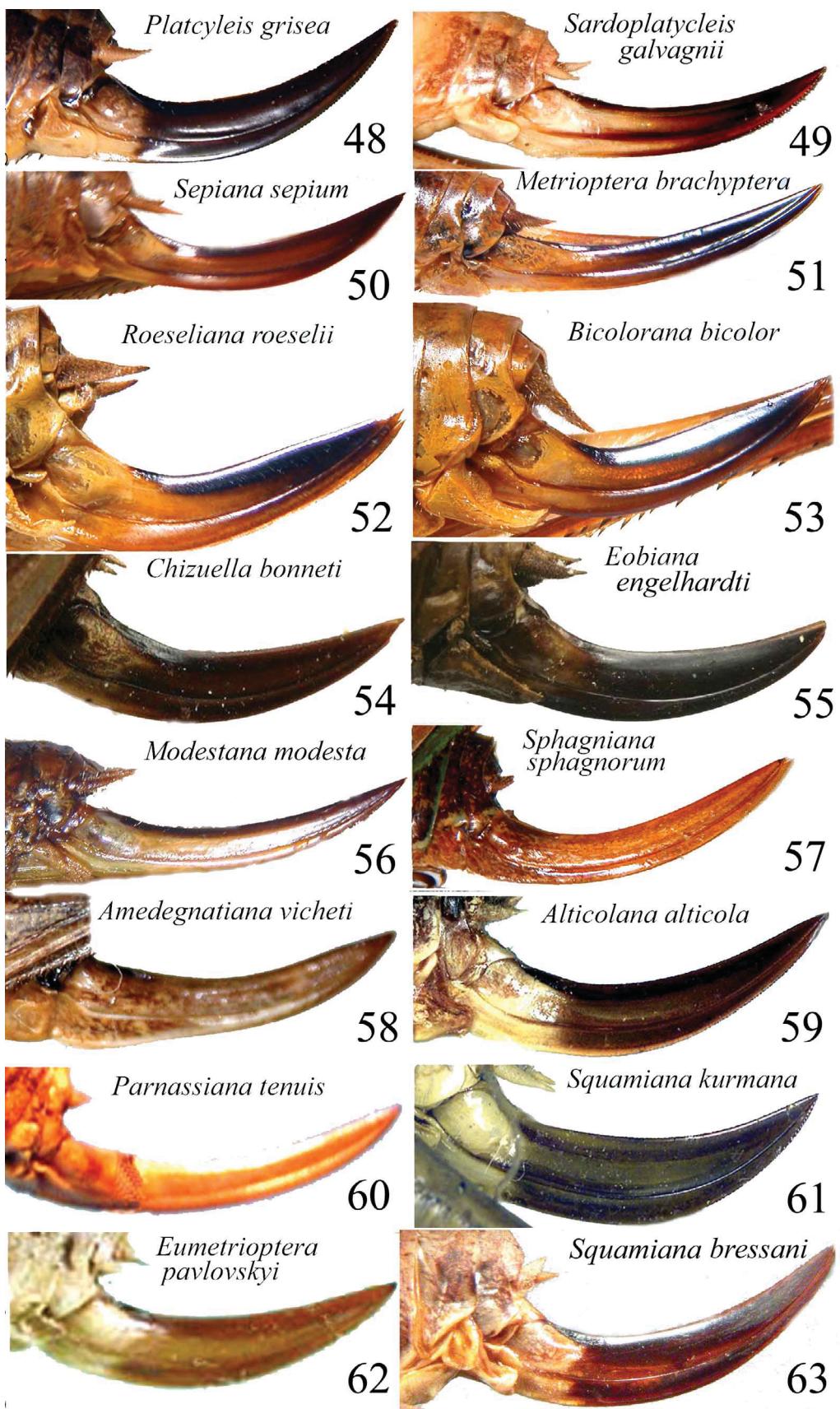
**FIGURES 33–42.** Lateral view of the pronotum of 10 species of Platycleidini, according to the present paper belonging to the genus *Decorana*.



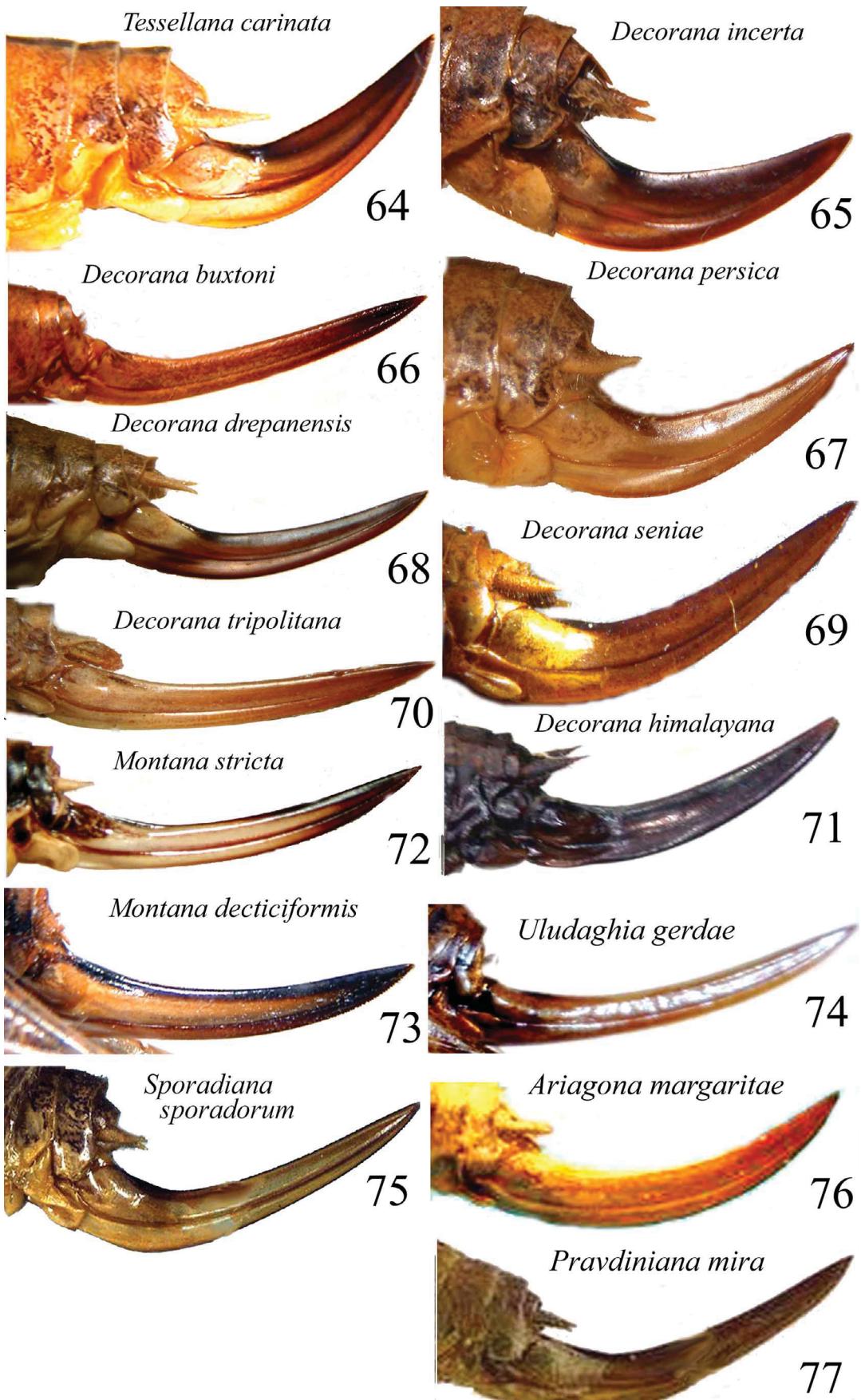
**FIGURES 43–46.** 43) and 44) Pronotum of *Tessellana nigrosignata* and *T. carinata* from above to show median keel; 45) and 46) Tegmina of *T. nigrosignata* and *T. orina* to show the different pattern of veinlets.



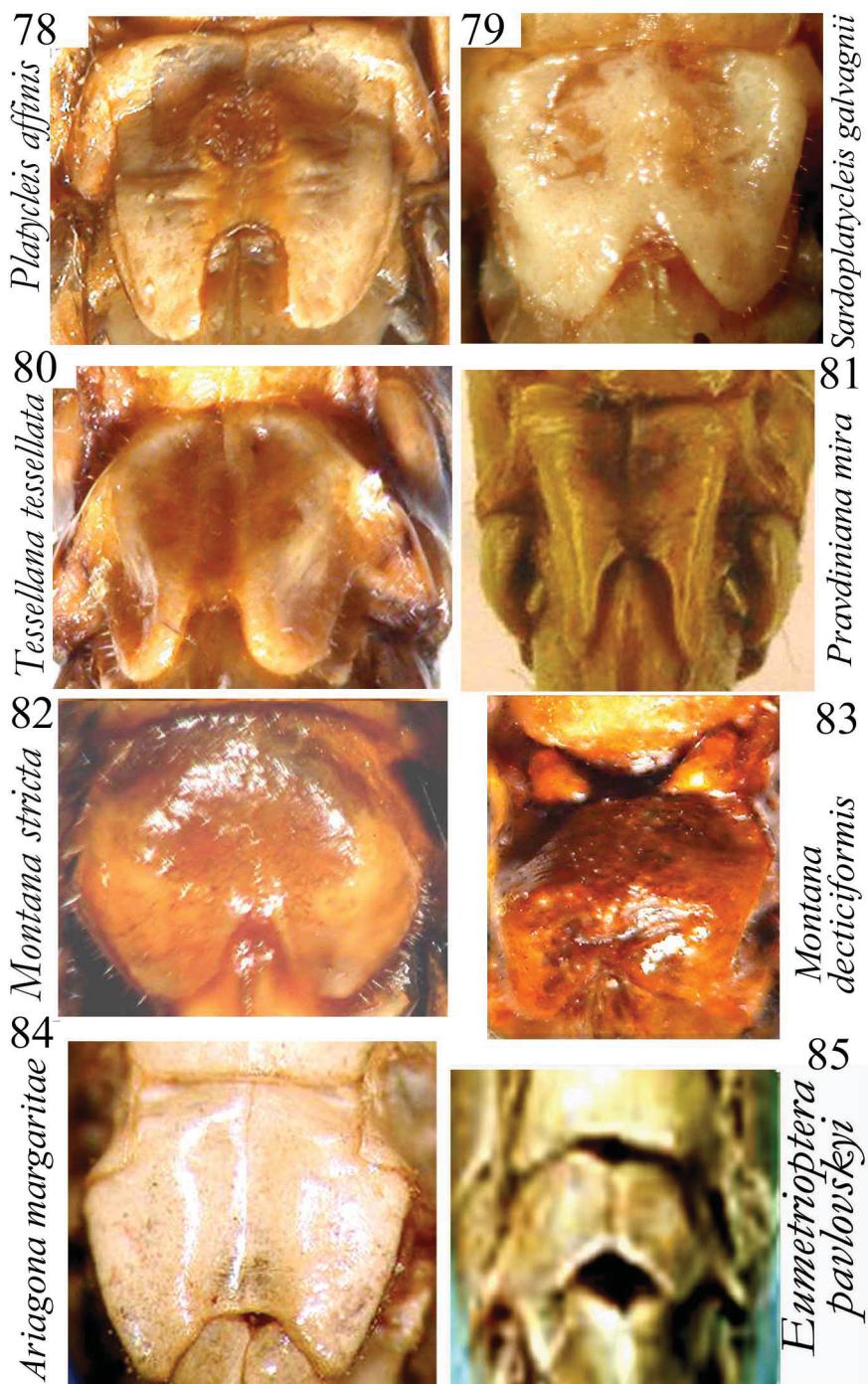
**FIGURE 47.** Measures (in mm) of pronotum length of different species of *Tessellana* plotted on the ratio 'length hind femora/length of tegmina' to show different position of the species. Above males, below females.



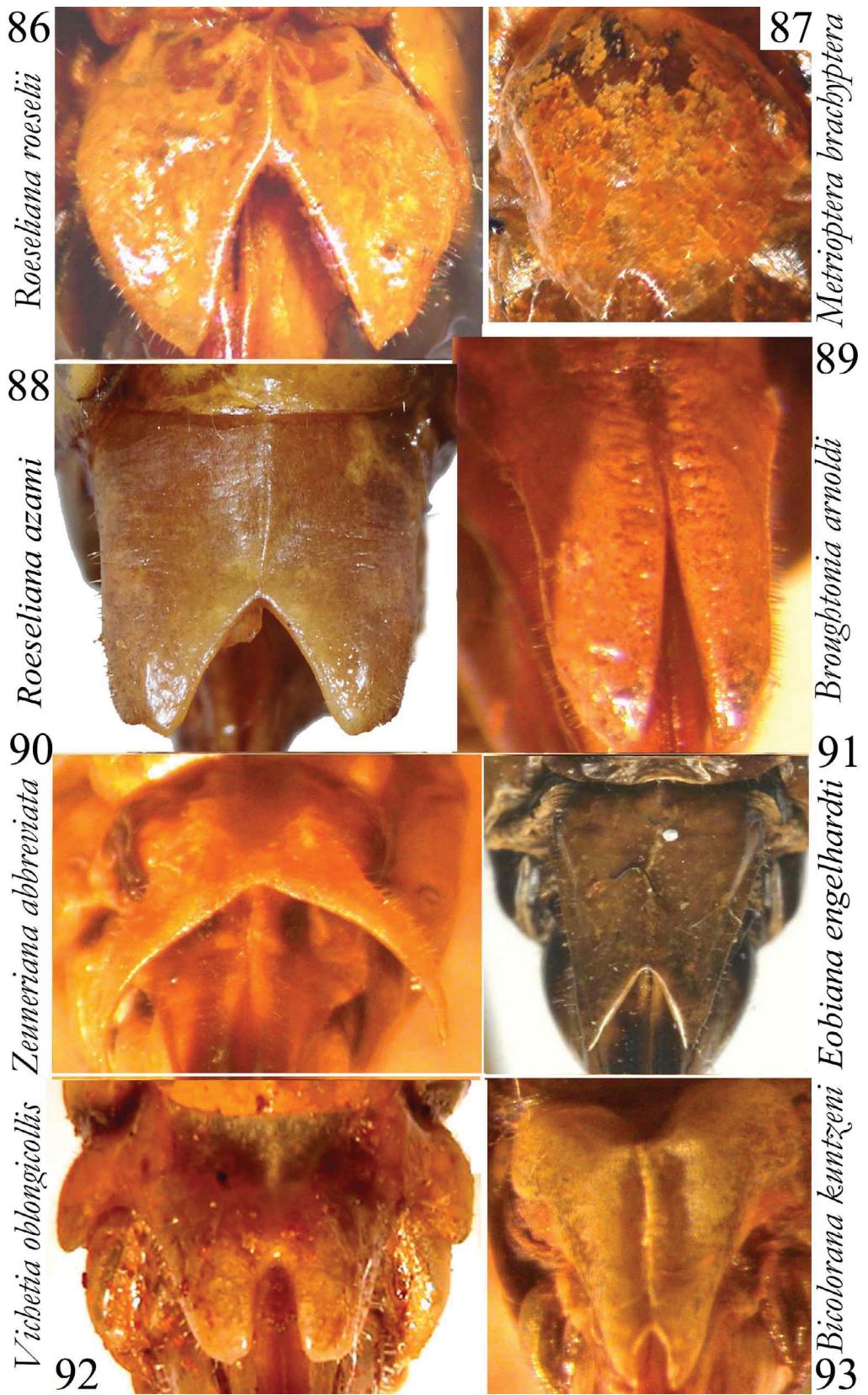
**FIGURES 48–63.** Lateral view of the ovipositor of 16 species of Platycleidini (*Platycleis*, *Sardoplatycleis*, *Sepiana*, *Metrioptera*, *Roeseliana*, *Bicolorana*, *Chizuella*, *Eobiana*, *Modestana*, *Sphagniana*, *Amedegnatiana*, *Alticolana*, *Parnassiana*, *Squamiana*, *Eumetrioptera*).



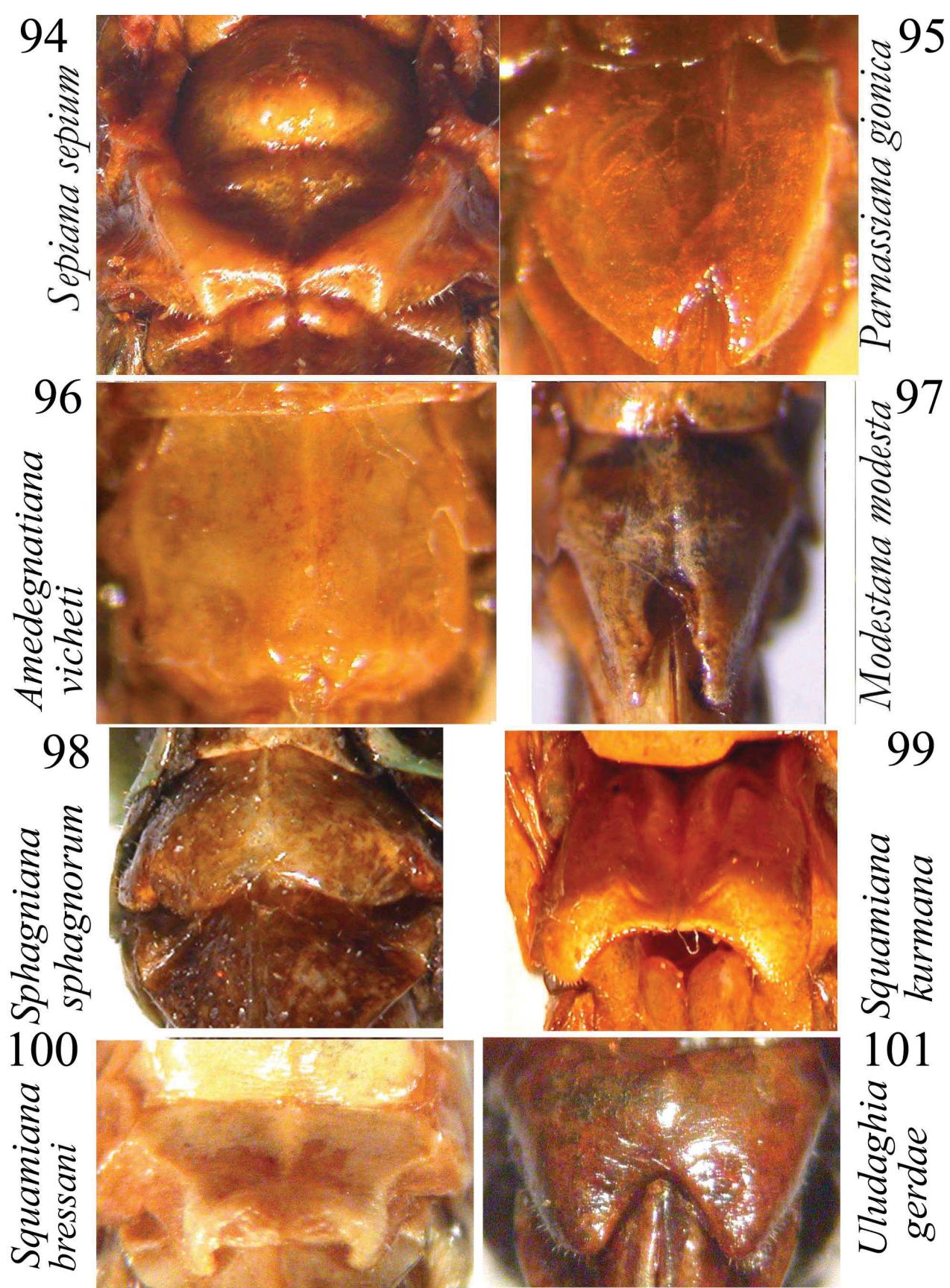
**FIGURES 64–77.** Lateral view of the ovipositor of other 14 species of Platycleidini (*Tessellana*, *Decorana*, *Montana*, *Uludaghia*, *Sporadiana*, *Ariagona*, *Pravdiniana*).



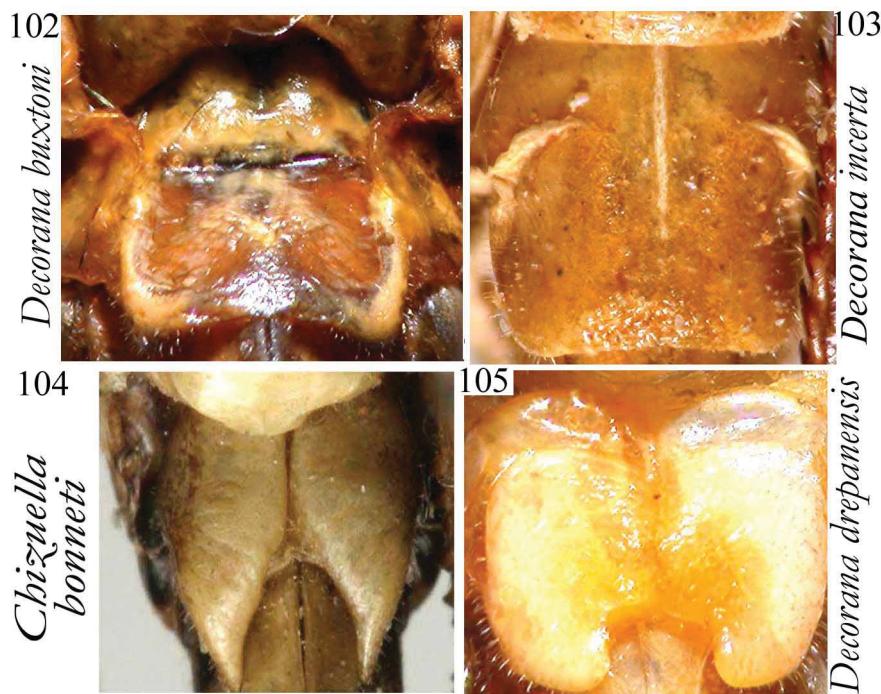
**FIGURES 78–85.** Subgenital plate of the female of 8 species of Platycleidini (*Platycleis*, *Sardoplatycleis*, *Tessellana*, *Pravdiniana*, *Montana*, *Ariagona*, *Eumetrioptera*).



**FIGURES 86–93.** Subgenital plate of the female of other 8 species of Platycleidini (*Roeseliana*, *Metrioptera*, *Broughtonia*, *Zeuneriana*, *Eobiana*, *Vichetia*, *Bicolorana*).

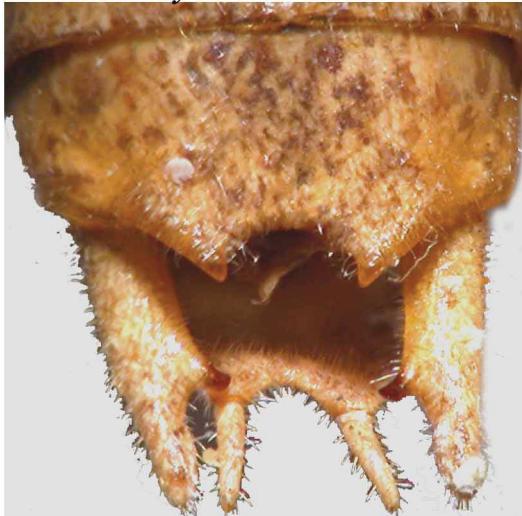


**FIGURES 94–101.** Subgenital plate of the female of other 8 species of Platycleidini (*Sepiana*, *Parnassiana*, *Amedegnatiana*, *Modestana*, *Sphagniana*, *Squamiana*, *Uludaghia*).



**FIGURES 102–105.** Subgenital plate of the female of other 4 species of Platycleidini (*Decorana*, *Chizuella*).

106 *Platycleis concii*



*Tessellana tessellata* 107



108 *Montana stricta*



*Modestana modesta* 109



*Zeuneriana marmorata*



110

*Sphagniana sphagnorum*



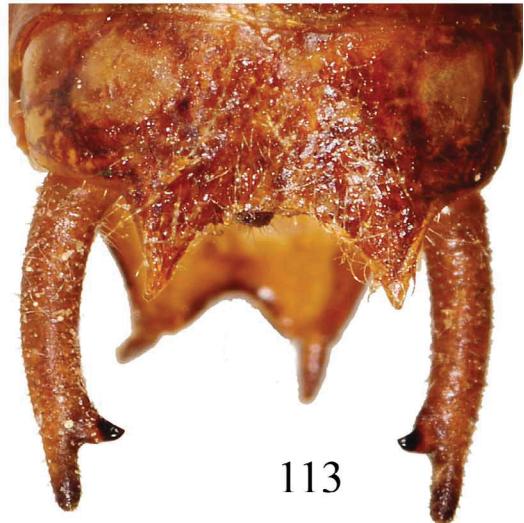
111

FIGURES 106–111. X<sup>th</sup> tergite of 6 species of Platycleidini (*Platycleis*, *Tessellana*, *Montana*, *Modestana*, *Zeuneriana*, *Sphagniana*).

*Metrioptera brachyptera*



*Roeseliana azami*



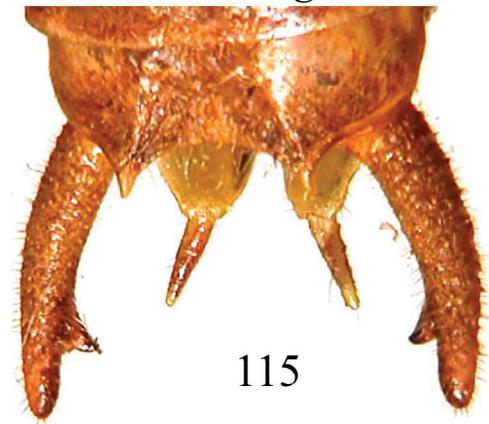
*Bicolorana kuntzeni*



112

113

*Vichetia oblongicollis*



115

*Broughtonia arnoldi*



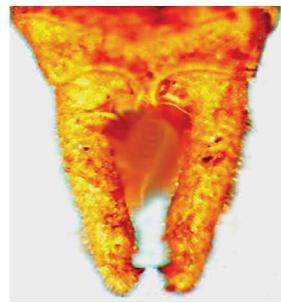
116

*Sepiana sepium*



118

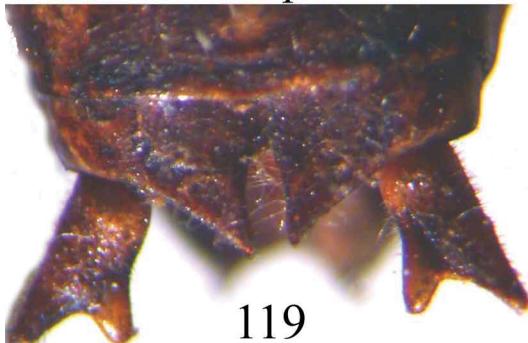
*Ariagona margaritae*



117

FIGURES 112–118. X<sup>th</sup> tergite of other 7 species of Platycleidini (*Metrioptera*, *Roeseliana*, *Bicolorana*, *Vichetia*, *Broughtonia*, *Sepiana*, *Ariagona*).

*Parnassiana parnassica*



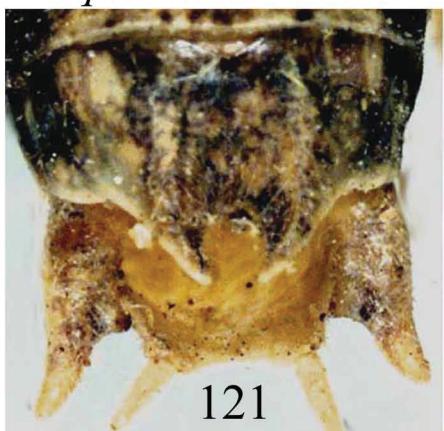
119

*Amedegnatiana vicheti*



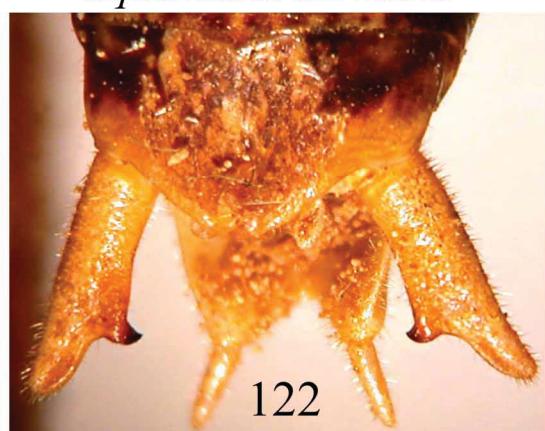
120

*Squamiana sinuata*



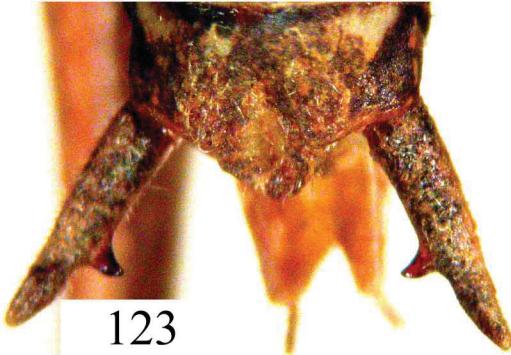
121

*Squamiana kurmana*



122

*Squamiana bressani*



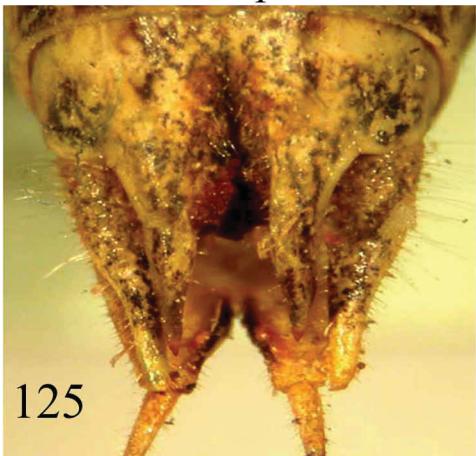
123

*Uludaghia gerdae*



124

*Decorana persica*



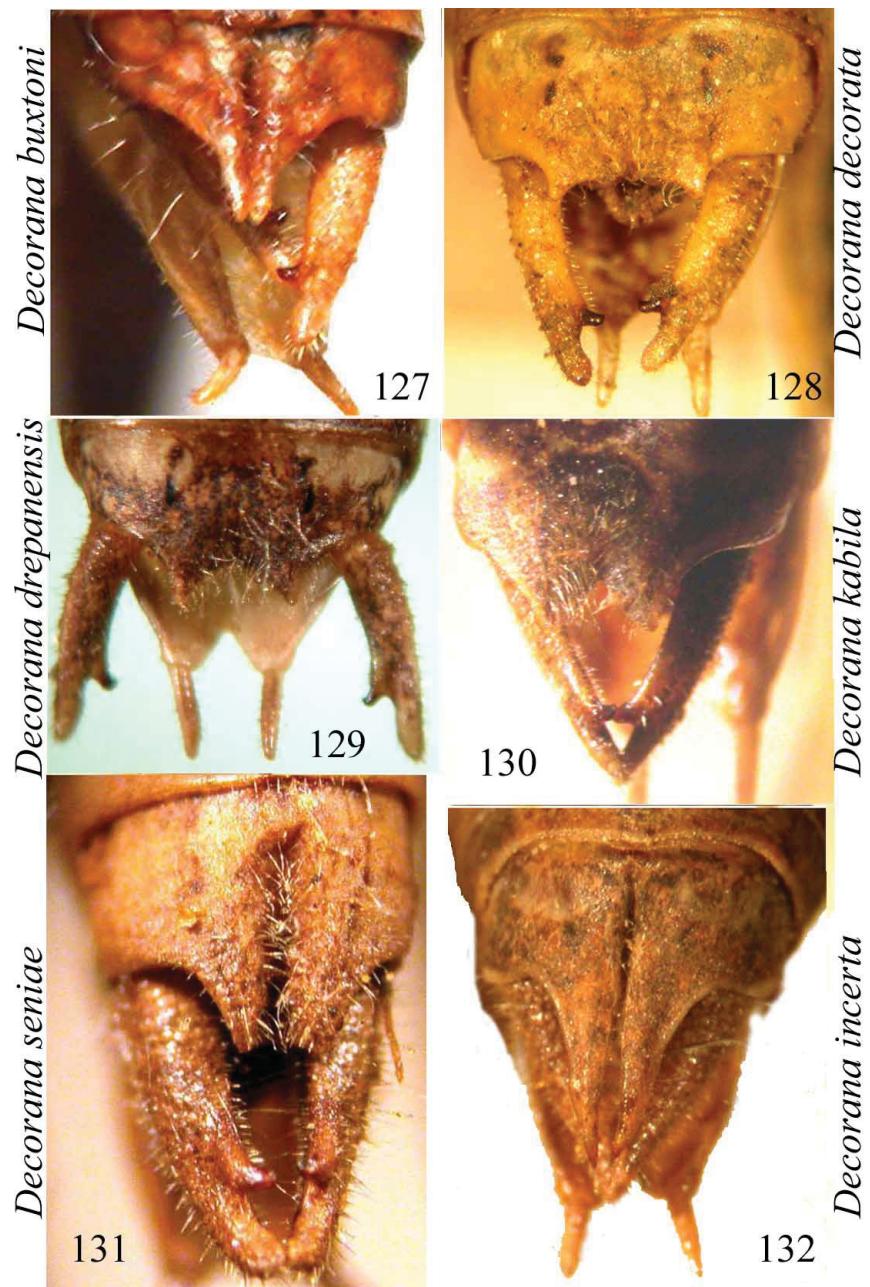
125

*Chizuella bonneti*



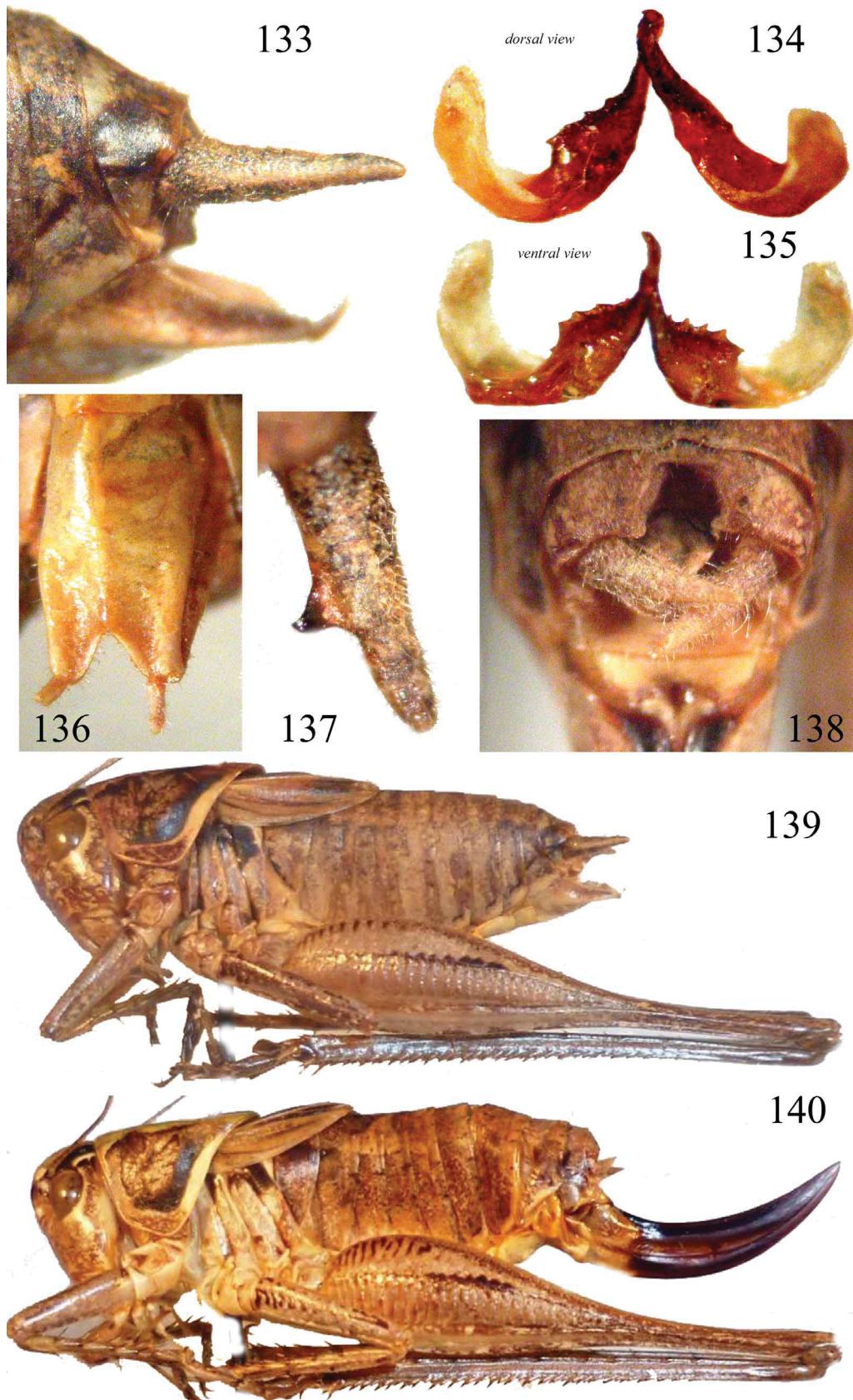
126

FIGURES 119–126. X<sup>th</sup> tergite of other 8 species of Platycleidini (*Parnassiana*, *Amedegnatiana*, *Squamiana*, *Uludaghia*, *Decorana*, *Chizuella*).



**FIGURES 127–132.** X<sup>th</sup> tergite of other 6 species of Platycleidini according to the present paper belonging to the genus *Decorana*.

*Squamiana bressani*



**FIGURES 133–140.** *Squamiana bressani* n.sp. 133) Lateral view of abdomen of the holotype; 134) and 135) Dorsal and ventral view of titillators of the holotype; 136) Subgenital plate of the holotype male; 137) Right cercus of the holotype; 138) Last tergite of the paratype female; 139) Lateral view of the holotype male; 140) Lateral view of the paratype female. See also Figs. 19, 63, 100 and 123.